

**BEFORE THE
NATURAL RESOURCES COMMISSION
OF THE
STATE OF INDIANA**

IN THE MATTER OF:

WILD ANIMAL REHABILITATION) Administrative Cause
PERMIT RULE AMENDMENTS) Number 10-015D
) (LSA Document #10-418(F))

**REPORT ON RULE PROCESSING, CONSIDERATION OF PUBLIC
COMMENTS, ANALYSIS AND RECOMMENDATION
REGARDING FINAL ADOPTION**

1. RULE PROCESSING

For consideration are proposed amendments to rules relating to Wild Animal Rehabilitation Permits under 312 IAC 9-10-9. The proposed amendments make various clarifications as well as add requirements. The most significant of the proposed amendments include testing for new permit applicants and continuing education for all permit holders as well as additional housing and release requirements associated with animals taken in for rehabilitation.

The Natural Resources Commission (*NRC*) granted preliminary adoption on May 18, 2010.

The "Notice of Intent" to adopt the proposed rule amendment was posted to the INDIANA REGISTER database website as 20100623-IR-312100418NIA on June 23, 2010. The notice identified Linnea Petercheff, Department of Natural Resources, Division of Fish and Wildlife, as the "small business regulatory coordinator" for purposes of Indiana Code § 4-22-2-28.1.

As specified by Executive Order, proposed fiscal analyses of the rule proposal were submitted, along with a copy of the proposed rule language and a copy of the posted Notice of Intent, to the Office of Management and Budget on June 29, 2010. In a letter dated September 21, 2010, Christopher A. Ruhl, Director, Office of Management and Budget, recommended that the proposed rule amendments be approved.

The NRC Division of Hearings submitted the rule proposal to the Legislative Services Agency (*LSA*) along with the "Statement Concerning Rules Affecting Small Business" (also known as the "Economic Impact Statement") on September 28, 2010. The Notice of Public Hearing was submitted to LSA on September 30, 2010. The Notice of Public

Hearing, along with the Economic Impact Statement and the text of the proposed rule was posted to the INDIANA REGISTER database website on October 13, 2010 as 20101013-IR-312100418PHA. Following receipt of an "Authorization to Proceed" from LSA on September 30, 2010, the NRC Division of Hearings also caused a Notice of Public Hearing to be published by the Indianapolis Newspapers, a newspaper of general circulation in Marion County Indiana, on October 18, 2010. In addition, the notice of the public hearing and a summary of the proposed rule changes were published on the Commission's web-based electronic calendar.

2. REPORT OF PUBLIC HEARING AND COMMENTS

a) Public Hearing Comments

The public hearing was conducted as scheduled on November 29, 2010 at 6:30 p.m. at the Fort Harrison State Park Inn, Theodore Room, 5830 North Post Road, Indianapolis, Indiana. Sandra L. Jensen was present to conduct the public hearing. Linnea Petercheff also attended.

Seventeen members of the public attended the public hearing. The comments received are attached as Exhibit A and are incorporated by reference.

b) Comments Received Outside Public Hearing

Written public comments were received from approximately May 18, 2010 until December 6, 2010. These written comments are attached to this report as Exhibit B and are incorporated by reference.

c) Response by the Department of Natural Resources

The Department of Natural Resources (*Department*) responded to the public comments on December 15, 2010. A copy of the Department's response is attached as Exhibit C, and is incorporated by reference. (Anyone receiving this report electronically should note that an exhibit attached and incorporated into the Department's response is being transmitted as a separate document entitled "Department Response Exhibit A".)

3. ANALYSIS AND RECOMMENDATION

The proposed rule amendments were developed through the collaborative efforts of a "Wild Animal Rehabilitation Advisory Group" following multiple enforcement actions having been taken against permit holders by the Department in recent years. The rule proposal that emerged includes numerous revisions and clarifications along with many new requirements for the holders of Wild Animal Rehabilitation Permits.

The most notable of the new requirements is (1) the need for new applicants to successfully pass a test before being issued a permit; (2) requiring permit holders to obtain continuing education; (3) establishing restrictions upon the numbers of certain mammals that may be rehabilitated and released; (4) restricting the locations where the rehabilitated animals may be released; (5) requiring wild animals to be released within 180 days (except in specified circumstances); (6) prohibiting the spaying and neutering of wild animals taken in for rehabilitation; (7) and requiring diseased animals received for rehabilitation to be euthanized.

The majority of the comments received from holders of Wild Animal Rehabilitation Permits favor the proposed rule amendments noting that the requirements, particularly those related to continuing education and testing, support the concept that wild animal rehabilitation is a profession.

However, certain written comments were received from licensed wild animal rehabilitators that questioned the appropriateness of requiring all mammals to be released in the county of origin.¹ These comments reflect that the rehabilitation of orphaned juvenile mammals frequently involves the establishment of groups that facilitate the rehabilitation efforts. The rehabilitators noted that these groups of juvenile mammals are housed together and need to be released together. These comments observe that these juvenile mammals, if separated and released alone, will typically die within a few weeks.

It was also noted in a written comment received from a licensed rehabilitator that wild juvenile birds released near their parents will be "driven off the territory and can suffer both injury and starvation."² Consequently, this comment suggested that rehabilitators be allowed to release juvenile birds at locations other than the point of origination. With respect to birds it was also reflected in a written comment that songbirds and perching birds, such as robins, blue jays, warblers and swallows, are not hunted or consumed and that there should be no necessity for a rehabilitator to maintain records relating to the administration of pharmaceutical products or chemicals.³

The Department's response acknowledged the concerns expressed in written comments by the licensed rehabilitators that were noted above and recommended revisions to address these comments.

Other individuals presented written comments expressing strong opposition to the rehabilitation of any coyotes.⁴ These comments reflect that coyote populations are

¹ See Exhibit C written comments of Patti Reynolds, Kathleen M. Hershey, Elaine Yarde, Susan Davis and Jennifer Cunningham as a few examples.

² See Exhibit C written comment of Patti Reynolds as an example.

³ See Exhibit C written comment of Pat Knight.

⁴ See Exhibit C written comments of Jason Schmiesing, Tim Rose and Christopher M. Skaggs as a few examples.

extremely high and that this species is putting the well-being of family pets, livestock, and other wild animals at risk. The Department concurred that coyotes can displace other native wild species, significantly impact ground-nesting birds, and attack agricultural animals as well as family pets. The Department also noted that the number of coyotes taken in by licensed wild animal rehabilitators in the past few years has been six. Therefore, limiting the number of coyotes that each licensed rehabilitator may take in and release will not impact the current numbers of coyotes that are rehabilitated annually but will minimize public concerns that large numbers of coyotes can be rehabilitated and released.

After considering all the comments received, the Department offered its response wherein it recommends that the rule language as published on October 13, 2010 at the INDIANA REGISTER database website be revised at subsection (n) and subsection (l). The revisions recommended by the Department are highlighted within the Department's report at pages 3 – 4 and 10. The revisions as offered will allow each licensed rehabilitator to release only two coyotes annually and will allow for juvenile mammals that were housed together during rehabilitation to be released as a group in the county where at least one member of the group originated. With respect to birds, the Department has recommended revisions to allow juvenile birds to be released at a site outside the county of origin and to revise the requirement to maintain records regarding the use of pharmaceutical or chemical products to include only mammals or reptiles.

The Department's recommended revisions result from written public comments received during the public comment period and are, in the opinion of the hearing officer, a logical outgrowth of the proposed rule as published. The rule with the recommended revisions appear to be sound in terms of protecting the wildlife being rehabilitated while balancing public concerns about nuisance wild animals. After fully considering all of the comments received and the Department's response to those comments it is recommended that the rule be granted final adoption with revisions. It is noted that the revisions being recommended for final adoption are incorporated into this report as Exhibit D and are different stylistically from what was included within the Department's response.

Dated: December 21, 2010

Sandra L. Jensen
Hearing Officer

“Exhibit A”

Public Hearing Comments

Susan Davis; Bloomington, IN; Wildcare Inc.

Davis stated that Wildcare, Inc. is a non-profit corporation that has rehabilitated over 11,000 mammals, birds and reptiles. Davis thanked Linnea Petercheff and others involved for the hard work that has lead to this proposal that “is going to strengthen what we do and how we do it.”

However, Davis expressed “strong objection” to subsection (n) that places restrictions on the release of mammals. Davis stated that to require pack animals (fox & coyote), herd animals (deer) and clan animals (raccoon) to be released in the county of origin is impractical and unwise. This type of release is not recommended by the NWRA (National Wildlife Rehabilitators Association) or the IWRC (International Wildlife Rehabilitation Council). Davis offered that raccoons come in to Wildcare very irregularly and mostly as orphans and rehabilitators build families with these orphaned raccoons because that is how they will survive in the wild. She explained that the families are built by age, size, health, intake date as quickly as possible. Additionally, the vaccination and worming protocols are coordinated with the building of the foster families in order to move the animals to outside pre-release cages as soon as practical. Davis noted that the animals released are healthy and have been vaccinated and wormed. They do not pose a threat to other wildlife.

According to Davis, Wildcare releases raccoons “no fewer than four; no more than eight” at various locations on private property where hunting and trapping is not allowed. The raccoons do not come in “neatly” in terms of county of origin and to build a family also taking into account the county of origin is “ridiculous”. Davis stated a single raccoon released alone will die within a few weeks and in 2010 Wildcare has received single Raccoons from Shelby, Hendricks, Vigo, Clay and Marion Counties. Davis noted that under the proposed rule these raccoons would have to be released alone and noted that they might as well be euthanized at the beginning as opposed to “going through the whole process to just release them into an environment where they are going to be dead in a few weeks.” Release of these animals alone is a “death sentence.” Davis noted that these same concerns are valid with respect to coyotes, foxes and deer.

Furthermore, Davis stated that the release restrictions are not practical. For example, Wildcare Inc. has received single coyotes from Hamilton, Marion, Monroe and Owen Counties, which means that under the proposed rule they will be required to identify proper release sites in each of these counties and then take the time to transport these single animals to many surrounding counties. Davis stated, “we’ve got to find a better way.”

Davis urged the relaxation of subsection (n) but stated that she “loves” the rest of the proposed rule, including the continuing education and the caging restrictions. “We think

it's high time for that; to all become professionalized and we are so pleased that you took the time to do that."

Davis submitted a written comment during the public hearing that is attached as Exhibit A1.

Michelle Manker; Hamilton County, IN; A Critters Chance

Manker stated that she is the founder and President of A Critters Chance that is also a non-profit. Manker offered agreement with the comments of Susan Davis, noting specifically that the education requirement.

She added that by the time the Department is able to confiscate wild animals that are being possessed illegally they have sometimes been in possession for a year or more and have been spayed or neutered. She inquired as to what "we can do to stop that"? Manker acknowledged that the Department does all it can but stated that there is nothing can be done for these animals except to euthanize them and she observed "that's not fair to us because we hate doing it too." She understood that this issue is not associated with this rule package but sought to bring it to the attention of the Department and Commission.

Meagan Angle; Indianapolis, IN; A Critters Chance

Angle expressed support for the comments made by Susan Davis. She also observed that there was a need to differentiate between adults and juveniles with respect to the release of the animals.

Tracy Eads; Hamilton County, IN; A Critters Chance

Eads offered her agreement with the comments of Susan Davis and Michelle Manker.

Leanne Boyce; Anderson, IN; A Critters Chance

Boyce also agreed with the previous comments relating to relaxing the requirement to release animals in the county of origin. She observed that many of the animals they receive are from highly populated residential areas. With those areas being "so congested with people" she opined that it's better to release them into places where "they are welcomed; they can be safe."

Boyce also raised concern about only being allowed to release 24 raccoons stating that they could take in that many raccoons in a day. She asked whether they are expected to euthanize every animal over that limit that comes in to them. Boyce stated that she and Amy Watson handled 78 raccoons last year. To handle that many, the number would have to be doubled or a volunteer working under a licensed rehabilitator would have to be allowed to release an additional 24 animals. Linnea Petercheff stated that the proposed language would require the additional animals to be euthanized or sent to another licensed rehabilitator.

Amy Watson; Madison County, IN

Watson expressed agreement with Susan Davis' comments adding that she recently took in some raccoons from Kosciusko County because she was unable to identify a

rehabilitator within a closer proximity to take them. Part of her comment related to the lack of professionalism of some rehabilitators in failing to communicate, which is not an actual part of the rule proposal being considered but she also expressed concern about having to travel to Kosciusko County to find a suitable release location for the raccoons. Watson inquired about the meaning of subsection (5)(b)(3), which allows only the release of 24 animals per species. She asked, whether that was "the permit holder and then another 24 for each volunteer under their permit or is that just 24 period?" Linnea Petercheff explained that it was 24 animals per permit, period. Petercheff noted that it only applied to skunks, raccoons, opossums, coyotes and foxes.

Jan Turner; Bloomington, IN; Wildcare, Inc.

Turner is the team leader for the fox and coyote team. She expressed agreement with the comments of Susan Davis and added that the return of animals to their county of origin is simply impractical. She explained that before a release may occur, she must "find a suitable release site", which is difficult when you are in a strange county. For Turner, identification of a release site involves checking for natural water sources, ensuring that the property is not already overpopulated and ensuring that no hunting or trapping occurs there. After a site is identified, Turner explained that she has to identify the property's owner, contact them and obtain permission to make a release. Turner reiterated that Wildcare, Inc. releases animals on property where hunting and trapping is not allowed and observed that a property owner "can tell you anything just to get the animals on their property." In addition to the expense and time associated with finding a release site in a strange county there is also the added expense associated with the feeding and housing of the animals during the period of time that a site is being identified.

Jennifer Cunningham; Bloomington, IN; Wildcare, Inc.

Cunningham stated that she is the deer team leader for Wildcare, Inc. She too expressed agreement with the comments offered by Susan Davis and others.

Cunningham noted that subsection (n)(2) states that "mammals must be tagged or marked as directed by the Department if given any pharmaceuticals..." She inquired whether this applied to every animal that is given any medicine explaining that the animals are always wormed and often given antibiotics and frequently sedatives have to be used to allow for wound cleaning. Linnea Petercheff clarified that subsection (n)(2) "applies only if it's been given one of these products or chemicals for the purpose of tranquilizing or anesthetizing the mammal so it would not apply to an antibiotic." Also Petercheff noted that if the "clearance period" for the product or chemical has passed there would be no requirement to tag or mark the mammal. If tagging or marking is necessary the Department should be contacted to identify the method by which the tagging or marking should be done.

Cunningham also commented on the release restrictions explaining that Wildcare, Inc. raises orphaned deer they received together. This allows the deer to learn from each other how to bed down and hunt for food. Cunningham stated that her groups stay together and to separate them for release to the county of origin would be nearly impossible because they all look the same. Wildcare, Inc. does not have facilities to

separate them during their rehabilitation and separation during their rehabilitation would be detrimental to the rehabilitation efforts in any event. Additionally she noted that "they will die from stress alone" trying to separate them for load-out. She stated, "its stressful enough loading them for one release let alone breaking them down into individuals." Cunningham explained that when deer are ready to be released Wildcare, Inc. moves a horse trailer into the deer's pen and feed the deer inside the trailer to acclimate them to the trailer. This process allows the deer to be loaded, transported and released without sedation. Cunningham stated that in the case of Wildcare, Inc. the ability to release within 50 miles of the facility would be better. She noted that alternative this might not work for every rehabilitator's situation.

Jennifer Kane; Bloomington, IN; Wildcare, Inc.

Kane wished to echo the sentiments of the previous comments.

Holly Carter; Boone County, IN

Carter is a rehabilitator who offered her agreement with the previous comments objecting to the release restrictions. She also stated that under subsection (5)(b)(3) of the proposed rule a rehabilitator can only release 24 raccoons. Carter noted that 24 raccoons can be received in one spring and she suggested an increase in the number of animals allowed to be rehabilitated or that the rule allow for sub-permittees to take in animals.

Kathy Hershey; Hope, IN; Utopia Wildlife

Hershey explained that in developing the proposed rule the thought about moving animals from county to county related to concern for the spread of disease and she acknowledged that "in adult animals that could be a problem". However, she stated that she would never consider raising or releasing juveniles by themselves. Hershey has obtained information regarding regulations other states have adopted that balance the need to release some animals in groups while also addressing concerns about the spread of diseases. The regulations specify that if one member of the group to be released originated from an area where there was a disease outbreak, "a hot spot", the entire group is required to be released into a "hot spot" area. Hershey reiterated that the animals being released have been quarantined, vaccinated and are healthy when released but this adds precaution against the spread of disease. Hershey stated that the regulation she was specifically referencing is from Colorado and advised that she would send a copy with a written comment.

Patti Reynolds; Nashville, IN; Return to the Wild

Reynolds stated that Return to the Wild is a not-for-profit raptor rehabilitation center. She stated that she is pleased with the discussion involved in the development of the proposed rule. She agreed that if the release of a mammal alone is going to cause it to die there is no reason the rehabilitate it. Reynolds noted that she does not rehabilitate mammals but agreed with the other comments and said, "I want to throw my support behind what they are saying."

She also noted that there are animals, such as turtles and adult raptors, that need to go back to their place of origin because "that's their territory." Some raptors mate for life

and she has observed mates coming to greet a raptor being released after rehabilitation. Reynolds stated though that young raptors should not go back to their place of origin because they are "going to get kicked off their parents' territory anyway." Therefore, Reynolds observed that along with the others who offered comments raptor rehabilitators also need some "flexibility."

Reynolds stated that it was her understanding that several people had offered comments in opposition to the continuing education requirement that is being added by the proposed rule and stated that she did not understand that opposition. Reynolds observed that the rehabilitators have worked hard, with the assistance of the Department, to have rehabilitation considered a "profession" and not a hobby. "My personal opinion is that if you're not interested in continuing education then there's a question in my mind about your level of responsibility to your animals and your fellow rehabbers and your commitment to having it thought of as a profession." Reynolds noted that one objection to the continuing education has been related to expense. She advised that IRAN puts on free seminars annually. "There's no reason to not be educated."

Kristen Heitman; Hamilton County, IN; Providence Wildlife

Heitman offered agreement with Susan Davis regarding the release of rehabilitated animals.

She commented about subsection (j) of the proposed rule. She stated, "it says individuals dropping off an animal for rehab may view or have contact with the wild animal. Do you mean that that person can keep coming back and coming back to check on their baby?... You have 10 to 15 people in a single day dropping something off to you, are you going to allow these good Samaritans to be paraded past every rehab patient you have? That is far too much contact with the public... I want to make sure that is not the intent of this." The hearing officer, after reading the proposed rule language, noted that the present wording of subsection (j) appeared to allow for the activity she expressed concerns about.

Heitman stated that the number of mammals allowed to be released is "artificially low" and inquired as to how the number was arrived at. Linnea Petercheff explained that "part of that is to limit the number of raccoons that are rehabilitated and released." Petercheff noted that there are thousands of homeowners who deal with nuisance raccoons who would not agree with the "high volume" of raccoons that are rehabilitated and released. She advised that the present population of raccoons is "quite high" and is contributing to the spread of canine distemper each year.

Carol Blacketer; Tippecanoe, IN; Wildcat Wildlife Center

Blacketer noted her agreement with all the previous comments offering particularly that the release of mammals as a group is "vitally important." Blacketer stated that the new state organization for wildlife rehabilitators is "dedicated to education." She stated that she does not understand anyone not wanting to continue to get education.

Blacketer expressed some concern over the "grandfathering in" explaining that her preference would be that no one be grandfathered in. She stated her belief that everyone should be treated equally.

Denise Hays; West Lafayette, IN; Wildcat Wildlife Center

Hays stated agreement with all the previous comments. She added that she also holds a Wild Animal Control Permit and under that permit she is required to take 32 hours of continuing education every four years. She stated, "I think it is absurd that I have to do 32 hours in four years to trap an animal, not have it in my possession more than 48 hours, euthanize it or relocate it and as a rehabilitator I have to do a little, pathetic eight hours in three years."

She added that cost is not an issue with respect to continuing education. She advised that Wildcat Wildlife Center puts on seminars for 16 hours of continuing education yearly and they are free and available for any licensed rehabilitator.

“Exhibit A1”

Public Hearing Monday, November 29, 2010 on Rehabilitation Permit Change Proposals

I'm Susan Davis and I am speaking on behalf of over 90 volunteers from WildCare Inc. in Bloomington, Indiana, a nonprofit that cares for sick, injured, and orphaned wildlife. Over 11,000 mammals, birds, and reptiles have been helped since we incorporated in 2001. While most of the proposals are excellent as well as necessary, (and we commend all the hard work of Linnea and her committee), the release restrictions for certain mammals are not at all sensitive to the needs of either the animals, or the public. For that reason we strongly object to the section where it states that mammals must be released ONLY in the county of origin.

Since policy looks very different looking down from the top, let me quickly share what it looks like looking up from where we are—boots on the ground.

Herd animals such as deer, pack animals such as foxes and coyotes, and clan animals such as raccoons should not be released singly. It is not recommended by either of the well-recognized National Wildlife Rehabilitators Association or the International Wildlife Rehabilitation Council, nor by rehabbers with years of experience in the field.

Raccoons are a clan animal and WildCare tries very hard not to release fewer than 4, nor more than 8 in a clan. Studies have shown that single raccoons released in new territory are dead within a few weeks.

On average we keep raccoon cubs 3 months and most of that is in pre release caging, which is limited to no more than 8 per cage or a total of 48 at any one time. Less if a clan has been closed for vaccinations and worming protocols. Our orphans do not come in neatly. We have to sort by age, size, and health, and as soon as they are old enough, they go into the pre release cages. They must first be vaccinated before going outside and then that schedule is followed for all in that clan. It is an unbelievable burden to expect us to also sort by the county of origin, or worse, split them by such at the time of release when we have been building a family for support.

Consider that since January 1, 2010 WildCare has taken in 66 raccoons. Besides the 22 from WildCare's Monroe county, raccoons came from the following adjacent counties:

Morgan	8	Fourteen came from counties that are not adjacent	
Owen	7		
Lawrence	6	Johnson	6
Greene	5	Orange	3
Brown	4	Shelby	1
Jackson	0	Hendricks	1
		Vigo	1
		Clay	1
		Marion	1

All released raccoons had been twice vaccinated for distemper and raccoon parvo. All were regularly wormed with Panacur for internal parasites. None had any external parasites. All had shown good health and development prior to release. All were released on private land, with owner permission where no hunting or trapping is allowed. These sites were spread around to several counties.

WildCare always tries to refer Finders to their closest rehabber, but many counties have no raccoon rehabbers, or the ones listed on the DNR website do not respond to their contacts.

Consider that since January 1st, WildCare has taken in 7 coyotes: 3 from Johnson; 1 from Hamilton; 1 from Marion; 1 from Monroe; and 1 from Owen. And 5 red foxes: 1 from Johnson; 2 from Hamilton; 1 from Marion; and 1 from Crawford.

They were raised as a pack and released together as recommended. Four of the seven coyotes came from people who initially tried to raise them as pets and either got caught by the DNR or learned it was illegal and feared being caught and fined. They surrendered the animals only after our team leader explained all that was needed to care for them.

Likewise, we take in fawns from various counties, raise them together and release them together. It's very difficult to find a safe place to release 20 fawns that need support throughout the first winter especially. We have such a sanctuary in Owen County away from populated areas and roads. Most of them came from populated areas in Monroe County. Bloomington, for example, has an urban deer task force to look at the growing concerns of deer within urban communities. We offer a humane solution to this problem of over development.

This is why we ask that you relax section (n) of the otherwise improved regulations for rehabilitators. Please consider substituting with "in the county of origin of one of the animals, or within a 50-mile radius of the county of origin." In our experience when Finders do not get the help they seek, they take matters into their own hands and that is not good for either these wild mammals or the people of Indiana.

“Exhibit B”

Comments Received Outside the Public Hearing:

PUBLIC COMMENTS

LSA Document #10-418

FW: Rehabilitation Permit Rule

Administrative Cause No. 10-015D

Kimberly A McMunn, Tippecanoe County, IN (Email: June 1, 2010)

On the whole I feel that the changes in regulations are well-written and I thank all those who spent the time and effort to come to a consensus on how best to care for the wildlife of the state of Indiana. At this point I have concerns with only two sections of the proposed regulations: Section 9, n, 5, A: A mammal must be released in the county from which it was originally found or obtained, unless the origin is unknown. These animals have legs, and do not respect county lines!!!! I feel it adds a great burden to those who rehabilitate large numbers of animals, and in some cases could compromise animal care.

For example, if a rehabilitator has multiple single young mammals come into rehab at the same time that are a similar age, they may group them together to re-create the litter that they lost (assuming a species that has larger litters). If those animals were from different counties, they may not be grouped, as they would need to be kept separate in order to know who was who later on. This compromises the animals, as they would normally be part of a litter at that age and have companions to help them with thermoregulation as well as learning natural behaviors, and now they will not have that as they will need to stay single in order to keep track of individuals and where they came from. It also adds a burden in that there will be more cages to deal with, many of them with just a single animal inside.

Realistically, I think this will end up being something that people will just lie about in the end. They will say an animal was released in one location, when actually it was released in another location with its rehab friends. It seems unenforceable and a burden to both rehabilitators and the enforcers of these regulations. Ideally the animals should go back to the county of origin, but if grouped with conspecifics, could they go back to the county of origin of the majority of the animals? Or be allowed to be released in the rehabilitator's home county as are the animals of unknown origin?

Section 9, s, 1 and 2-Why must a diseased animal automatically be euthanized? What exactly constitutes a disease state vs. an infection vs. an injury? Some diseases/infections (such as mange) may be readily treatable, while others (distemper in raccoons) clearly are not. Yet no distinction is made in (1) to clarify. Yet in section (2) a vet is allowed to say an injury can be treatable? Why can't the same vet determine whether a particular disease is treatable? In my experience, most wildlife diseases are not treatable, but it seems a shame to needlessly take the lives of the few that come in that do have a treatable disease.

Laura Nirenberg La Porte, La Porte County, Wildlife Orphanage Inc., (Email: June 5, 2010)

These proposed wildlife rehabilitation rules as proposed, are potentially harmful to wildlife rehabilitators, the wild animals they serve to protect, and the public. For instance, the language as currently written regarding people who take possession of injured/orphaned wildlife in an attempt to place them with a licensed rehabilitator needs to be revised. It is often impossible for people to place an animal within a 24 hour period, despite their diligent efforts. That being the case, many individuals will be subjected to fines/punishment when their intent to help the animal was pure. Rather than require people place these animals within a 24 hour period, the language should read within a "reasonable amount of time."

The rule surrounding a 180 day maximum holding period for white-tailed deer is arbitrary, counter-productive, and potentially life-threatening to not only the deer but the wildlife rehabilitators themselves. Responsible rehabilitators slowly introduce deer to the wild by taking them out daily and extending their stay until the animals are naturally acclimated. Unfortunately, during hunting season, wild deer herds are not intact and thus, there are no wild family units for these fawns to hook-up with. Additionally, the rehabilitator's life is threatened whenever walking through the woods during hunting season accompanied by a herd of deer. A simple solution to this ill-conceived rule is a mandatory holding period of 240 days. The increase of 60 days will have no burden whatsoever on the DNR and increase the likelihood of survivability of the fawns and rehabilitators! Releasing these animals at an older age and in a safer environment will also make them less prone to venture into the street where they become roadway hazards for drivers.

Additionally troubling is the mandatory county of origin release rule. It is impossible to know with any certainty where these animals truly come from as people tend to pass them around from one "animal lover" to another, until they finally reach a rehabilitator. When they finally do arrive, they are quarantined and then slowly acclimated to others of the same species and size/age. These animals form tight bonds out of necessity. Ripping these family units apart to return them to the questionable "place of origin" is again counter-productive as these animals will not survive. To minimize the burden placed on rehabilitators and wildlife in these situations, the mandatory release sites should be within the county of "perceived origin or an adjacent county."

Although the DNR is concerned about the potential for the transmission of wildlife diseases, they should take comfort in the fact that these animals are monitored for months prior to release. I am personally unfamiliar with any rehabilitator who would release an animal that was exhibiting symptoms of illness. Our goal is to give these animals the best chance possible for a healthy life – releasing a sick animal dreadfully conflicts with that objective.

Although I approve of the idea surrounding continuing education requirement, I remain concerned about the financial burden that this will have on rehabilitators and the availability of programs. As mentioned to Linnea Petercheff several months ago, I again recommend that wildlife rehabilitators be provided the same opportunities offered to hunters. Hunters interested in a hunting education course simply need to call a conservation officer and request that a program be provided. The law requires that they

be provided one within 90 days. Wildlife rehabilitators, as constituents of the DNR-- specifically, the Division of Fish & Wildlife, should be entitled to the same convenience.

The DNR has unfortunately refused to acknowledge the fact that the majority of people do not have the capacity to ignore the suffering of animals in need -- as evidenced by the hundreds of calls our organization receives annually. In order to address this public demand, the state of Indiana needs more rehabilitators -- not fewer. The language as it currently reads is going to continue to force rehabilitators to stop providing this FREE service as it forces us to employ techniques that are not conducive to the animals' well being. Inevitably, there will be an increase in untrained, unlicensed individuals performing this work. That being the case, the DNR will have no way to determine where animals are coming and going in the event of a disease outbreak; will have no record of who has been exposed to these animals; nor will they have any opportunity to insure the welfare of the animals they are statutorily entrusted to protect.

Priscilla Herochik, Crown Point, IN (Email: June 7, 2010)

Written Response In Opposition to the Proposed Changes in the Rules for Wildlife Rehabilitation in Indiana and Response originally submitted April 5 and now re-submitted June 7, 2010. Prepared by Priscilla Herochik, R.N.J.D., on behalf of her own interests and on behalf of the 130 members of Advocates for Indiana Wildlife, 352 members of Stop a Revision of the Wildlife Rehab Rules in Indiana and 383 members of Stop the Indiana Wildlife Extermination Rules.

RESPONSE TO PROPOSED RULE CHANGES FOR INDIANA WILDLIFE REHABILITATORS

INTRODUCTION: I am a citizen of the state of Indiana, a registered nurse, an attorney and a voluntary wildlife rehabilitator. Thus, I have standing to enjoy Indiana's wildlife in my own compassionate way, just as hunters and trappers can enjoy wildlife in their own deadly way. I am licensed as a rehabilitator by the state of Indiana and have been so in good standing since I started rehabilitating wildlife. I am a member of the National Wildlife Rehabilitators Association. In the past, about 90 percent of my wards were raccoons. I now confine my rehabilitation to primarily raccoons with the exception of a rare skunk or squirrel. I am submitting this comment on behalf of myself and on behalf of the members of these organizations that I have created and administer.

The following statute incorporates the status of Indiana's wildlife, how they relate to the citizens of Indiana, the standing of Indiana's citizens and the duties of the Division of Fish and Wildlife (DFW): 14-22-1-1. Wild animals are property of the people -- Department to protect and manage. (a) All wild animals, except those that are: (1) Legally owned or being held in captivity under a license or permit as required by this article; or (2) Otherwise excepted in this article; are the property of the people of Indiana. (b) The department shall protect and properly manage the fish and wildlife resources of Indiana. Is singling out two species, raccoons and coyotes, labeling them nuisance animals and working on their extermination except for those who happen to live in areas where they can be hunted and trapped for fun and fur a reasonable means to "protect and properly manage the fish and wildlife resource of Indiana" for the enjoyment of all Indiana's citizens? In my opinion, it is not. Nor is it sound management.

If over-population of raccoons is the true problem, rehabilitators should be encouraged to capture and spay or neuter those in overly-populated areas or find ways to treat them with contraceptive medications. Instead, these new rules directly prohibit

them from doing so. It seems more likely that the DFW in the DNR wants to keep high levels of raccoons available for hunting and trapping but do it in a way where they stay in the woods to be trapped, never go out into the farmers' fields to eat corn, never eat bird eggs and just eat acorns and grow lush fur. Once that is accomplished, it is hoped that each will walk into a trap and wait to be shot or bludgeoned to death so that their lifeless body can be stripped of its fur. Hunters and trappers are encouraged to practice their "sport." However, if one enjoys the wildlife not by killing it, but by nurturing it, those citizens have no usefulness to the DNR. This is because, even though they each spend thousands of dollars per year to practice their enjoyment of wildlife activities and help Indiana's wildlife, trappers and hunters pay the DNR for a license to kill them, eat them or sell their fur.

Let me point out, right from the start, how disingenuous I find this entire exercise in entrenched power. This is the agency whose members don't blink an eye at 100,000 raccoons in Indiana per year being killed for their fur, many caught in traps, often bludgeoned until unconscious or dead and, if still alive, killed by the trappers standing on their chests. This is the agency that allows hunters to track raccoons with dogs, during the time of year when mothers are nursing their cubs, only to shoot them out of trees to be mauled to death by the hounds. This is the agency that allows bow hunters to shoot deer with arrows being fully aware of the literature supporting that 50 percent are only wounded and escape to suffer and die later. Because of this past history, who would not be skeptical regarding the Division of Fish and Wildlife's present showing of compassionate concern? Yet, for some reason, they are now obsessively worried about how rehabilitators, who love, cherish and care for these animals, are treating the raccoons and other wildlife. And so they feel that these new proposed rules should set out difficult and irrational procedures for educating the rehabilitators and for housing, feeding, cage cleaning, medicating and releasing wildlife. Moreover, not to be overlooked in the case of adults, the DFW also added a mandate that rehabilitators must "euthanize" those raccoons or coyotes so unfortunate as to weigh over 13 or 20 pounds respectively. K Kathy Hershey, a member of the Advisory Group, suggested the following to me by email: If you want to do something about the law, you should find a way to reword it so that a differentiation is made between "sick" and short-term injury in adults. In all of the years I have been rehabilitating raccoons, I have received only a handful that were only slightly injured and that could be successfully released. Rewording would make it possible to treat these.

Since the concern was apparently related to the release of sick animals, such as with distemper or rabies, I took Kathy's advice. I, to no avail, suggested the following language instead, and several other rehabilitators also suggested such language: Any raccoons showing signs of neurological impairment, not known to be related to physical treatable injury, and suggestive of distemperencephalitis, such as with seizures, must be euthanized by a qualified individual trained in euthanasia of animals.

It is obvious that killing 20 or 30 adult raccoons each year will not impact upon any of the erroneous and overly-stated problems perceived by the DFW. However, although the rules will solve no wildlife problems, they will serve to demoralize rehabilitators and put them in the position of compromising their ethics or breaking the law. The intent of these revised rules is clear: the effect, and most likely the purpose, of

these revised rules is to end rehabilitation of raccoons and coyotes altogether and perhaps some other mammals, such as foxes, as well.

I suspect that these new rules were designed to discourage entry of new raccoon/coyote rehabilitators, block continued rehabilitation by present rehabilitators and, in the near future, end rehabilitation of raccoons and coyotes entirely, both of which species are now relegated to nothing but nuisance status by the Division of Fish and Wildlife (DFW). This abject hatred for raccoons and coyotes as a species is clear from the Advisory Group Minutes of February 20, 2009, (attached) and from the delineation of excuses to kill them in the Petercheff summary (attached) sent to individuals who opposed this rule in emails to the governor's office. To the powers that be, raccoons and coyotes are just as annoying, troublesome and worthy of species extermination as are mosquitoes and flies. The DFW wants to deprive those who choose to enjoy Indiana's commonly-owned wildlife by nurturing, rather than killing them, from doing so. This is clear in that they want rehabilitators to be compelled to do exactly what they cannot ethically do--kill healthy wild animals or arrange for that to be done by someone else.

In fact, the latest revision of the draft, dated March 29, 2010, is worse than the first. Several of the changes that Linnea Petercheff represented would be incorporated in the draft of March 2, 2010 (sent as attachment) were not incorporated. The highlight text provides the changes she said she would make:

(2) The applicant has correctly answered at least eighty percent(80%) of the questions on a written examination supervised and administered by the department covering basic biology and care of wild animals and the laws relating to wild animal rehabilitation. The questions will originate from department study materials and will be used in continuing education opportunities sponsored by the department. 3) A permit holder who has satisfied subdivision (2) must, within three (3) years of being issued a permit, either: (A) satisfy the same requirements as are set forth in subdivision (2) on another examination; or (B) complete eight (8) hours of continuing education as approved by the division, including courses that will be sponsored by the department, National Wildlife Rehabilitator's Association or International Wildlife Rehabilitation Council. (4) An individual who fails an examination under this section may retake the examination one (1) additional time within forty-five (45) days, but not again within one hundred eighty (180) days after the second failure unless the individual has completed continuing education approved by the division, in which case the individual may take the test for a third time within one hundred eighty (180) days from the time the test was first taken.

Yet, the new proposed rules draft of March 26, 2010, unless I miss edit, notes nothing about department study materials and continuing education to be offered by the department. The most recent draft does not indicate the source from which the questions will originate. This draft keeps all rehabilitators in the dark as to obtaining references for study since it fails to mention a department publication or CE that would be provided. Just as the hunters have hunter's education provided, the DNR should provide continuing education for the rehabilitators and should provide a manual which could be used for teaching and learning about the subject matter. As now written, the questions could be pulled from any obscure materials. It guarantees the failure of the test by many rehabilitators. Other objectionable parts remain. It still requires raccoons, coyotes and deer to be released within 180 days and in the county of origin when often such release is premature and when release in county of origin or adjacent counties would make more

sense as was suggested by several rehabilitators, including me. After all, raccoons, coyotes and deer cross county borders all the time. Moreover, although now moved to section 9(r) with changed wording, these rules still mandate that rehabilitators arrange for the killing of healthy adult raccoons that come into their care. This is not consistent with the ethics of most rehabilitators and directly and discriminately interferes with their ability to enjoy the commonly-owned wildlife.

And, yes, I used the four-letter L word when referring to my wards: Love. And I use it because pretending to be a robot or Mr. Spock from Star Trek when caring for infant animals is pointless, unrealistic and insincere. Rehabilitators do care about the animals--that is our way of enjoying the wildlife of Indiana, which is commonly owned by all of us. Hunters and trappers enjoy them by killing them-- we enjoy them by saving their lives, nurturing them and watching them grow or recover from injury. And, just as we celebrate when our children grow up and leave home, we welcome the time when they can be released to enjoy life in the wild, hopefully in a safe environment where they won't be shot or bludgeoned to death.

Part One of my comments addresses how these new rules in effect discourage and disallow rehabilitators to enjoy the publicly-owned wildlife in their way. It explains how the new rules unequally apply rules to similarly situated groups of citizens seeking to enjoy Indiana's wildlife. Part Two specifically addresses each issue raised in the summary sent to individuals who emailed officials of the state of Indiana to protest these proposed rules. This summary was prepared by Ms. Petercheff, Operations Staff Specialist for the DFW. I am also attaching a link to my ongoing petition which to date has 630 signatures in opposition to the mandated extermination of adult raccoons portion of these proposed rules. I will bring copies of other signature pages with to the April 14 meeting. I am at this time specifically requesting that I be allowed to speak at this meeting.

One final note in this introduction: Although I just rehabilitate raccoons, what I am saying in most cases equally applies to the rules as they pertain to coyotes and deer. Rehabilitators care for them to enjoy them and help the wildlife. Forcing them to comply with unreasonable and irrational rules, such as requiring release of rehabilitated deer within 180 days, which is during hunting season, is especially cruel to both the deer and the rehabilitators. Rehabilitators should not have to endure the agony of knowing that the animals they cared for have become nothing more than venison veal for the hunters. I don't think any tragedy would befall the hunters if they had to wait until a deer was at least a year old and had a chance to adjust to life in the wild before they had the opportunity to kill it.

I. PART ONE

A. Wildlife Management and the Public Trust Doctrine.

I have been rehabilitating raccoons as a licensed rehabilitator for Indiana's DNR for ten years now. It costs me approximately \$ 5,000 more or less each year to care for the animals that I rehabilitate for the benefit of the citizens of the state of Indiana. I provide housing, formula before weaning and fruit, vegetables and dog food after weaning. I get up in the middle of the night for 3 am feedings. I spend most of my waking hours feeding baby raccoons and cleaning their portable dens from when I get the first ones, usually in late March or early April until they are weaned from the bottle in approximately May and June. During that time, I do at least one load of laundry every day. That involves costs

for bleach and detergent. Even before weaning, my raccoons are vaccinated, at my expense, to protect them against canine distemper and parvo. Thus, when they are released, they remain healthy and don't contribute to transmission of those diseases. After the raccoons are weaned, I spend a lot of time changing dirty water, providing a proper diet, cleaning out litter boxes and generally allowing these juveniles to learn what they need to know to become self sufficient and independent adults. I have never received a penny from the DNR or the state of Indiana for my services on behalf of wildlife. I have never asked for any compensation, and none has ever been offered. I have never made a penny from rehabilitating wildlife. In fact, I knew that going forward because the DNR prohibits rehabilitators from making any money related to rehabilitation. Why do I do it? Because I am a citizen of Indiana, and I deeply care about Indiana's wildlife. Because this is my way of enjoying Indiana's wildlife--the wildlife owned in common by every citizen of Indiana, including me and every other wildlife rehabilitator. Because of the happiness and satisfaction that I feel each fall when I release a brood of healthy, independent raccoons that, but for my intervention, would have died prematurely. Bottle-feeding and caring for baby raccoons leads to a special bond on my part with these animals. These babies are as beautiful, affectionate and non-vicious as any puppy or kitten. As mammals, they are biologically no different. Before they are weaned, they form a bond with me that continues through the weaning process. However, although the bond that I feel for them continues, as soon as they are replaced in the outside cages, they start to change. They soon realize that they are raccoons, not people. They never become vicious toward me, and even in the outside pens, I am usually able to have enough contact with them to give them their second vaccinations at 10 to 12 weeks of age. However, as they continue to mature, they change even more. They learn to associate with one another and form strong bonds with one another. By the time they are ready for release at approximately 5 months of age, they are very independent, very willful, very reclusive and want very little to do with me. Once I release them, within a month of release, it would be rare for any of them to allow me to touch them.

Yet, I never lose my affection for these creatures. They are some of the most intelligent, non-aggressive animals that I have ever learned to appreciate. They travel in groups with one another and rarely act aggressively when eating at the feeding station. They are devoted parents and often bring their families to my feeding station year after year in the spring. I have seen them demonstrate amazing empathy for one another. Because of how much I have learned about these animals, I have learned to deeply appreciate their traits and their characteristics. To me, they are no different than a dog or a cat. In fact, as to the basics, they are not much different than we are. They need to eat, drink, have a place to live and they love their young. They suffer just like we do when they are left in the woods to die.

I tell you all of these things for a reason. It is quite obvious that, given my close and nurturing relationship to these animals as they are rehabilitated, I come from a dramatically different perspective than that of hunters and trappers. What might not be as obvious to the DNR is the validity of my differences and the truism that my way of appreciating Indiana's wildlife is just as worthy of protection as is that of a hunter or a trapper. Rehabilitating these animals is every bit as important to me as hunting and trapping is to hunters and trappers. Moreover, hikers, birdwatchers, animal

photographers and rehabilitators, are just as entitled to enjoy Indiana's wildlife in their own ways as are hunters and trappers. I recognize that and, although the DNR at this point seems reluctant to recognize the importance of this, it is a truism that should be recognized.

We nurture these animals for two reasons: we enjoy doing it and we care about the animals. If we wanted to kill them, we'd become trappers or breeders who kill over 100,000 of our raccoons every year just to make a buck selling a \$ 6.00 pelt. We don't desire to kill them, and we should not be compelled to do what goes against our ideology and our ethics: kill healthy wild animals needlessly. Trappers are allowed to kill these animals, and are allowed to do so inhumanely by hitting them on the head and standing on their chests until they are dead. Given those facts, it is clear that although the DFW may care about some particular species, it does not care much about the individual. Rehabilitators, on average, care for less than two thousand raccoons per year, as opposed to the more than 100,000 killed by trappers, often inhumanely, each year. In light of this, the rigid portions of the proposed rules, supposedly being required to ensure humane care, ring somewhat hollow.

Pursuant to the Public Trust Doctrine (PTD), Indiana's wildlife are held in trust for all of Indiana's citizens. A recent article from the Journal of Wildlife Management explains the PTD as such: The PTD is considered the foundation of the North American Model of Wildlife Conservation, a set of principles applied within the Institution (Geist et al. 2001, Geist and Organ 2004). A postulate of the PTD is that wildlife is owned by no one and held in trust by governments for the benefit of present and future generations (i.e., a public or common resource, not private property). The PTD stems from a United States Supreme Court ruling in 1842 (*Martin v. Waddell*, 41 U.S. 234), and its application to wildlife has been strengthened through subsequent court decisions (Horner 2000). Functionally, the PTD is common law (Sax 1970) that provides legal bedrock for government at the federal and state levels to protect, conserve, allocate, and control wildlife for the benefit of the public. In theory, it defines the limits for human impacts to and withdrawal of wildlife resources. Smith (1980) identifies 3 criteria that need to be met for the PTD to be an effective tool: 1) the general public must be aware of their legal standing with respect to public ownership of wildlife; 2) this standing and the rights associated with it must be enforceable against the government so that the public can hold it accountable; and 3) interpretation of these rights must be adaptable to contemporary concerns, such as biodiversity and species extinction. As noted earlier, Indiana's statutory and case law also recognizes that Indiana's citizens commonly own all of Indiana's wildlife.

Although not justified, it is understandable that at this point in time the DNR continues to cater to hunters and trappers. The DNR is almost exclusively supported by licenses issued to hunters and trappers. However, that is not the promise of the future. Nor does it take away the fact that since each of us has a stake in the wildlife, each of us is entitled to enjoy wildlife in our own way. These are the words of the 21st Century articles as it relates to this issue: Fundamentally, the Institution exists because society values wildlife. . . Many of the forces weakening the PTD can be attributed to failures of the Institution to address contemporary concerns, and a lack of awareness among the general public about their role in advocacy and enforcement of their rights.

As 21st Century notes, and is applicable in Indiana, Wildlife conservation, particularly at the state level, is funded primarily by hunters, trappers, and gun owners. .the user pay benefit model depends on the continuing interest of wildlife users, most notably hunters who pay for wildlife management via license sales and through purchasing firearms and ammunition. . . A philosophical question is, should an institution founded on the PTD rely solely on a few user groups that are a small minority of society? Gill (1996:63) suggested that the narrowly based funding of state wildlife management has "blurred the essential distinction between public interest and special interest and inevitably eroded both scientific credibility and public trust." Because hunters pay the bills, it is not surprising that they are given much attention and wield a great deal of influence within the Institution (e.g., in terms of representation on boards and commissions, game-focused programs and spending; Nie 2004, Jacobson and Decker 2006); in essence they are privileged while other interested stakeholders remain underrepresented and underserved. According to the PTD, wildlife is owned by no one and held in trust for the benefit of all, but with the user pay benefit model, those who both derive direct benefits from wildlife and fund wildlife conservation from user fees may believe they have the only legitimate voice in governance of public wildlife conservation and management. . . . the core premise of the PTD (is) that wildlife is a public resource and no single stakeholder group should benefit from wildlife management more than others. . . Moreover the 21st Century reminds us of the financial risks incompletely hunter/trapper controlled policy: the user pay benefit model depends on the continuing interest of wildlife users, most notably hunters who pay for wildlife management via license sales and through purchasing firearms and ammunition, versus all beneficiaries of wildlife conservation contributing through a non-voluntary mechanism. If user numbers decline as has been occurring with hunters on a national level (Responsive Management/National Shooting Sports Foundation 2008), the Institution faces financial difficulty. The 21st Century article advocates for Involvement of Diverse Stakeholders and Partners: The Institution has been criticized for being captured (unduly influenced) by consumptive interest groups (Loker et al. 1994, Beck 1998). Some have even gone as far as suggesting that an iron-triangle relationship exists among resource management agencies, traditional user groups (e.g., hunters), and policy makers that "limits access to resource management decision processes to those outside the triangle and creates still more social tension and conflict" (Gill 2004:37). The iron-triangle concept suggests that those with different institutional logics (e.g., nonhunters) are excluded, formally (e.g., by not being legitimized through membership on a wildlife board or commission) or informally (e.g., by lack of access to existing informal, long-standing networks), from equal influence on and access to the state wildlife decision-making process. . . , we propose that the development of enduring, diverse, and effective partnerships focused on the broad goal of wildlife conservation is essential for the future of the Institution. . . The main outcome desired from reform of the Institution is effective and sustained conservation. To achieve this, a significant portion of society must value and demand conservation that ensures that the basic tenets of the PTD are achieved. That means meeting diverse stakeholder expectations for the broad range of impacts associated with the presence of wildlife. Ultimately, coexistence of humans and wildlife in North America requires interventions that influence all 3 core components of wildlife management and the interactions among and between them: habitats, wildlife

populations, and people. The Institution of the future needs to attend to the broad array of these interactions and deliver benefits for society overall. Such an institution will not be the exclusive domain of wildlife biologists and hunters. It will include the interests and expertise of land-use planners, developers, large and small landowners, political leaders, social scientists, consumers of food, fiber, and energy, and many others. To retain or increase relevancy of the Institution in the future, it will be necessary for large segments of society to develop increased understanding and appreciation for coexistence of people and wildlife on a sustainable basis. A conservation ethic that fosters passion for positive human interactions with wildlife would be a valuable first step. Much like Leopold's land ethic (Leopold 1949), it will be critical that citizens of all ages increase their understanding and awareness of the importance, on balance, of wild animals and habitats to their quality of life, even in the face of some human-wildlife interactions that have negative impacts for people. Developing an understanding and awareness of the importance of human-wildlife coexistence is a societal trait that should be fostered and reinforced by the Institution. Reform of the Institution to address the full swath of societal needs and concerns with respect to wildlife should lead to broad, active public support (not just tolerance) for the Institution. The Institution should be capable of minimizing 2 major threats to wildlife conservation in the 21st century: 1) public ignorance, apathy, and values (i.e., lack of a conservation ethic) that lead to irrevocable losses of wildlife and habitat; and 2) human-wildlife interactions, experienced or perceived, that foster negative attitudes toward wildlife and habitat. We are concerned that these threats, if not addressed by the Institution, will have 2 undesirable results. One is loss of biodiversity and the other is devolution of the status of wildlife from resources to pests. Either result may be sufficient to threaten sustainability of wildlife; both taken together are certain to have such an effect. It is our view that if these 2 undesirable results occur, the future of the Institution is at risk because it will have failed in its fundamental purpose. Consequently, these threats alone represent sufficient concern to warrant reform of the Institution no matter how difficult it may be.

I know that I have referenced the 21st Century article extensively. I do so because it explains several basic concepts that should be important to all of Indiana's citizens. One is the fact that each citizen has a right to equal treatment as equal beneficiaries under the system: Not just hunters and trappers but also birdwatchers, hikers, wildlife photographers and rehabilitators of wildlife in Indiana. The other is the risk entailed in a system that does not encourage co-existence between people and wildlife and is attempting to place at least two Indiana species, raccoons and coyotes, in the category of pest or nuisance with no regard for their right to exist as wildlife in our state.

The truism of how I described the nurturing relationship that, in my opinion, most rehabilitators have with their wards demonstrates the unreasonableness of this proposed rule mandating that we kill healthy raccoons. It flies in the face of what we do, what we believe and who we are. It violates our rules of ethics and compromises our sense of morality. Moreover, it is scientifically flawed. Read what Dr. Stephen Franz, former Director of the New York Board of Health said about it when he signed the petition opposing this rule: 12:45 pm PST, Feb 11, Stephen Frantz, Massachusetts In short, Indiana's proposed euthanasia policy for raccoons and coyotes is not bio-logical. The basic science of population dynamics tells us that culling populations in the manner

suggested will stimulate population growth in both targeted species which is probably not the "desired" outcome. Carefully monitoring the growth of the existing populations while significantly reducing causative factors such as the availability of household garbage and, perhaps, there-introduction of predators, would be a logical start to a functional, sustainable management program. Further, the suggestion that rehabbers should bear the cost of such a poorly conceived policy is both mean-spirited and against the philosophy of wildlife rehabilitation.

This rule is not unlike asking a pro-life doctor to be mandated by the state to perform abortions. All of the truisms already stated support only one conclusion: This proposed rule, which would mandate that those who ethically and morally feel obligated to help and nurture wildlife must instead kill healthy raccoons and coyotes, for no rationally supportable reason, is poorly conceived, inappropriate and not at all consistent with the Public Trust Doctrine or equal treatment of all Indiana citizens under the law.

B. The Rule Requiring Rehabilitators to Exterminate Adult Mammals

I appreciate the minor modifications that Ms. Petercheff made to some portions of the original draft of the proposed rules. However, portions of the proposed rules related to test question source, release in county of origin and killing of healthy adults remain troubling and the DFW has provided no specific rationale for the proposals. This was from the original draft: (j) (f) As soon as a wild animal is capable of fending for itself, the animal shall must be released into the wild as directed by a conservation officer. . . (6) For mammals, the following applies: (A) All adult raccoons (thirteen pounds or more unless examined by a licensed veterinarian or department employee and determined to be a juvenile) and coyotes (twenty pounds or more) must be euthanized.

(B) A raccoon, Virginia opossum, skunk, coyote or fox must be released only in the county from which it was originally found or obtained. The part on killing the raccoons and coyotes was replaced by this: (r) All adult raccoons (thirteen pounds or more unless examined by a licensed veterinarian or department employee and determined to be a juvenile) and coyotes (twenty pounds or more) must be euthanized.

These rules serve no legitimate purpose toward achieving any reasonable goals. Part Two now delineates how all of the reasons offered to support these rules offer no real support at all.

II. PART TWO

The attached summary was drafted by Ms. Petercheff. It is here in called the Explanation. It provides the rationale offered in support of the proposed rules. (Will be sent by attachment) Excerpts from Ms. Petercheff's Explanation (In italics) and responses to them follow: A The Compromise to Allow Continued Rehabilitation of Raccoons and Coyotes The Wild Animal Rehabilitation Advisory Group discussed the rehabilitation of raccoons, coyotes, and a variety of other species at their meeting in February of 2009. While some members of the group had concerns about any raccoons or coyotes being taken in for rehabilitation and released back into the wild, the members of the group compromised and agreed to continue to allow juvenile raccoons and coyotes to be rehabilitated and released, with conditions set by the DNR, such as limiting the numbers of rehabilitators that can handle them or limiting the numbers that can be released and where.

It was probably a wise decision not to completely disallow rehabilitation. If you look at the laws enacted and then repealed in New York and Connecticut regarding the

rehabbing of rabies vectors, one can easily understand the wisdom of not prohibiting rehabilitation entirely. "Discussion Points: Rehabilitation of Rabies Vector Species and Public Safety" written by Laura Simon notes the benefits of keeping rehabilitation of these animals in the hands of the rehabilitators if not, it merely goes underground and untrained citizens then do it. See also the legislative history in New York State. That state had rabies in raccoons, stopped allowing rehabilitation and had to allow it again--it had merely gone underground. Also, note the words of Michael W. McGuill, DVM, MPH, the State Public Health Veterinarian, Massachusetts Department of Public Health in 1999. On November 12 of that year he wrote the Chairman of the Natural Resources Commission advising them as to how "the RVS Rehabilitation Problem has proven to be extremely effective" and that "the greatest advantage of the program is that it protects public health." Thus, considering the history of these states, it would seem that keeping RVS babies in the hands of Wildlife Rehabilitators is the wiser choice. Moreover, based upon my conversations with some of the advisory group members, this document is not entirely accurate. There was no agreement to the killing of healthy raccoons and coyotes. There was no agreement to a 13 or 20-pound weight limit. Several of the few committee members who actually rehabilitate raccoons were not happy with what was going on and, it was reported, that at least one was "disgusted" by it. The minutes reflect a 4-page rant against raccoons by a small number of individuals including Dr. Norman from the Health Department. Moreover, a question was offered by a DNR official as to "is it an option to sell the fur of the euthanized animals?" Is this at all sensitive to the position of rehabilitators who don't want to kill but choose to nurture and release raccoons? Is this the type of comment that would lead one to think that the DNR was concerned about the welfare of these animals or the rights of the rehabilitators to equal treatment under the law? Does this not display at least the appearance of impropriety in that one could speculate that these new proposals provide an ulterior motive for a singled-out species extermination effort for wildlife not living in places where they could already be killed for their fur?

B The Requirement to Exterminate Healthy Animals

The next statement: The DNR is, therefore, proposing to require that all adult raccoons and adult coyotes be euthanized. ...

Two significant problems exist in that statement. First, what is being proposed is not euthanasia. Second, there will be no way to universally and fairly enforce a rule such as this one. As to euthanasia, according to Dictionary.com, euthanasia is: "the act of putting to death painlessly or allowing to die, as by withholding extreme medical measures, a person or animal suffering from an incurable, esp. a painful, disease or condition." Wikipedia defines it as: "Animal euthanasia (from the Greek meaning "good death") is the act of putting to death painlessly or allowing to die, as by withholding extreme medical measures, an animal suffering from an incurable, esp. a painful, disease or condition. Euthanasia methods are designed to cause minimal pain and distress. According to Merriam Webster On Line, euthanasia is: the act or practice of killing or permitting the death of hopelessly sick or injured individuals (as persons or domestic animals) in a relatively painless way for reasons of mercy.

So, clearly euthanasia is only done for the benefit of the animal not for the benefit of the agency. Killing animals that are releasable back into nature is not euthanasia. Secondly, this rule won't be enforceable in a generalized way. The conservation officers

already overburdened with their other duties. Where will they find the time to enforce this new rule? How will they learn of infractions? It can never be enforced fairly and universally, only sporadically and discriminately. How does that provide equal protection of the law to wildlife rehabilitators? Frankly, it just doesn't.

C. Diseases that Naturally Occur in Wildlife and the Fear Spectrum about them
The proffered reasons then include the following: Raccoons carry a number of infectious diseases and parasites, some of which can be transferred to humans and domestic animals. Query: Why is this suddenly a problem now? All animals can contract and carry diseases, including humans. These same diseases mentioned by the DNR have existed in raccoons, coyotes, dogs and cats for hundreds of years if not thousands of years. They are not new and have not been a problem in the past. Nor is there any evidence to suggest that any of these potentials for disease are more of a problem now. Indiana has not had raccoon rabies in the last 30 years. Unfortunately, in light of these new proposed rules and the apparent mindset of this agency, one could easily have concerns for the safety of all raccoons with the entire species being at risk. Given the present raccoon-extermination suggestions now, how would raccoons be treated if one were so unfortunate as to become rabid? Thankfully, if you read the 2008 report as to rabies from the JAVMA, rabies is certainly less of a problem in raccoons particularly in our most neighboring state, Ohio. It had a 54.5 % decrease in raccoon rabies. See the results: Decreases of 50% in the numbers of rabid raccoons during 2008 were reported by 3 of the 20 eastern states where raccoon rabies is enzootic (ie, Vermont, 60.2% decrease from 2007 [103 cases] to 2008 [41 cases]; Rhode Island, 57.1% decrease from 2007 [21 cases] to 2008 [9 cases]; and Ohio, 54.5% decrease from 2007 [11 cases] to 2008 [5 cases]) and by New York City (77.5% decrease from 2007 [40 cases] to 2008 [9 cases]) Moreover, see my response from Prof. Gehrt from Ohio State regarding the rabies issue:

Hi Priscilla, Sorry for the delay in getting back to you. Our papers from the NSF study are either in review or in press, and have not come out yet. So far, it looks like the raccoon rabies has been held at bay along the Ohio-Pennsylvania border. Last year I believe there were only 1 or 2 positive raccoons in Ohio, all in the bait zone. The USDA continues to drop baits each fall and spring, and it seems to have made a difference. There has been a steady decline in cases since 2004, and no geographic spread since then. Hope this helps, Stanley D. Gehrt, PhD Associate Professor of Wildlife Ecology School of Environment and Natural Resources 210 Kottman Hall The Ohio State University 2021 Coffey Rd Columbus , OH 43210 Voice: 614-292-1930

Query: If the DNR is fearful about rabies, what is Indiana doing to protect its citizens from the potential threat of rabies in our wildlife? Has Indiana started bait drops on the border to prevent the disease from entering Indiana since we've had no raccoon rabies in 30 years and we would like to keep it that way? Moreover, if rabies is a threat, why were trappers and breeders allowed to trap, kill, handle and skin 111,305 raccoons in 2009 and 3,913 coyotes in 2009? Who is more likely to be bitten by a rabid animal than someone trying to kill it by the methods allowed for trappers? Here's an excerpt from a page in the Trapping Manual, Chapter 14, on Running a Trap line which has the approval of the Indiana Department of Natural Resources:

I have included above and in bold the relevant part of the trappers' manual describing the "euthanasia" of trapped animals without using a gun. An analysis of the implications is troubling. Who cannot legally carry a fire arm in Indiana? A child who is

too young and someone convicted of a felony. So, not having a gun, the child or the felon is supposed to strike a trapped animal in the back of the head at the base of the skull with a heavy object. If any of you have ever encountered a trapped raccoon, as I have on occasion in my garage, you would realize it will not let you get to the back of its head. It will keep turning its head, with its eyes fixed on you, whether trapped in my garage accidentally or trapped in a trap line intentionally. So, in reality these animals are beaten in whatever part of the head can be reached until they stop moving.

Then our young or felonious trapper must stand on the chest until the raccoon is dead. Most likely, the raccoon will not be inclined to cooperate. Instead, it will then strike. I doubt boots would stop the bite, which would most likely aim for the leg above the boot. And since I've had frightened raccoons bite through welding gloves, I doubt that even boots would stop one that is in agony and in fear for its very life. So, if rabies is indeed such a risk, then trappers should be told of the risk and trapping should be suspended until the DNR has done sufficient rabies vaccine drops on the border to guarantee that the trappers and their dogs won't be at risk. In light of the fact that trapping most likely won't be suspended, I don't see how anyone should be asked to take the rabies scare seriously.

Moreover, even if we assume arguendo that rabies is a huge problem, why would killing the few adult raccoons and coyotes that come to rehabilitators make any difference at all? Wouldn't the only solution be to take some of the money from the trappers' licenses and use it to do vaccine drops thereby protecting the trappers, the general populace and the wildlife? Why must the DNR just resort to needless killing as the only solution?

Citizens are more and more demanding of non-lethal solutions to wildlife problems. How about putting Indiana in the forefront of progress by doing the rabies vaccine drops and adopting the non-lethal methods demanded by most citizens?

D. Panic about Canine Distemper The explanations then continue:

Canine distemper is probably the most common disease carried by raccoons and is prevalent in Indiana, possibly due to the high population of raccoons. It can be transmitted to other canines, including domestic dogs and foxes.

Since nothing for support was cited, I am curious as to how any of this relates to raccoons that are released by rehabilitators, including adult ones? Rehabilitated raccoons, including adults, are routinely vaccinated against CD. The article from the Journal of Wildlife Diseases reveals that Galaxy D provides as much protection to raccoons as to dogs. Note as follows: In the present vaccination trial, Galaxy D. proved effective in promoting a humoral response in that all sero negative animals developed measurable serum CDV NAb titers by the second week PV. The lack of local or systemic reactions suggests sufficient attenuation of this vaccinal strain for use in raccoons. Finally, while only three of four control raccoons developed clinical signs over the 42 day follow-up period, all four had lesions due to CD. Sixteen vaccinated raccoons, with titers at challenge ranging from 1:12 to 1:384, remained free of clinical signs of disease over a 42 days follow-up period, and none had gross or microscopic lesions of CD when euthanatized at that time. Statistically significant protection from clinical or subclinical infection was therefore achieved with Galaxy D. (0/16 vs. 4/4).

So a raccoon released by a rehabilitator, be it a juvenile or an adult, after being vaccinated is far less likely to spread disease than those already in the wild. Vaccination of adults can be done with one dose before release. In any event, a healthy adult raccoon

brought in for rehabilitation has no more chance of having CD than one in the woods. Furthermore, in what rational way would killing healthy adult raccoons brought to rehabilitators lessen this problem? Would it not be more rational to require that rehabilitators arrange to euthanize sick animals in need of euthanasia no matter what age? In fact, this is the alternative language instead of the language based on weight that I suggested for this rule to Linnea but she said it was out of her hands: From: Priscilla Herochik [mailto:herochik@sbcglobal.net] Sent: Thursday, March 18, 2010 6:46 PM To: Petercheff, Linnea Subject: RE: Any Further Changes to the Proposed Rules? Thank you, Linnea. And I do appreciate the changes that were made. Is there any way to consider some better approach regarding the adult raccoon/coyote issue? If the concern is related to coons with canine distemper being released into the wild, I think most if not all rehabbers would agree with that and already euthanize both adults and babies with CD encephalitis. I know that I do. Perhaps the rule could be changed to something more reflective of disease implications such as: Any raccoons showing signs of neurological impairment, not known to be related to physical treatable injury, and suggestive of distemper encephalitis, such as with seizures, must be euthanized by a qualified individual trained in euthanasia of animals. I think most rehabbers would be very comfortable with such a rule because it recognizes what good rehabilitation already requires.

I should add that dogs should not be at risk from raccoons with distemper because dogs are routinely immunized against distemper. If they are not, they should be because those dogs could be transmitting CD to healthy raccoon, coyotes and foxes and other canines as could any other diseased animal. Is the DNR demanding proof of inoculation against rabies and distemper for all dogs used in hunting? The DNR is obliged to protect wildlife. Requiring proof of vaccination of dogs used to hunt is an essential element necessary to protect wildlife from additional exposure to those diseases.

Moreover, this rule will change nothing as to distemper because knowledgeable rehabilitators already arrange for euthanasia of animals sick with encephalitic canine distemper. Again, if there is a problem with some rehabilitators not knowing that such animals need to be euthanized, there are less drastic, and more effective, means to accomplish such an appropriate goal than killing all of the healthy adults. The DNR approach is just throwing the babies, or should I say the adults, out with the bathwater.

E. Panic about Parvo

Next, the response mentions parvo in that some raccoons taken in by rehabilitators have also been found to have raccoon parvovirus. The DNR has received multiple reports from licensed rehabilitators of raccoons dying from this while in their possession. That some raccoons get and die from parvo while being rehabilitated should not come as a surprise because some raccoons in the wild also have parvovirus and many of those most likely die as well. In fact, although parvo can be treated during rehabilitation, I am at a loss as to how it could be treated in the wild. I am sure that the DNR is not suggesting that we should kill all the raccoons in the wild as well as those in rehabilitation since wild raccoons can also have parvo virus and could die from it. Moreover, wildlife rehabilitators can vaccinate raccoons, including healthy adults, against parvovirus which provides some protection--far more than the ones in the wild have. And, again, is the DNR requiring that all hunters who use dogs provide proof of vaccination of these dogs against parvo to prevent the spread of the disease to wildlife?

If not, it should be. The response then mentions problems when the raccoons are not housed properly to prevent the spread of disease and problems with releasing raccoons with parvovirus or distemper.

Let me first mention that improper housing and releasing sick animals into the wild are two separate, distinct and unrelated problems. If the problem is in the housing, then fix that problem. One need not blame it on the possibility of disease or on the rehabilitation of adult raccoons. And how does this relate in any way to killing healthy adults brought in? How does killing adults tend in any way to solve a housing problem or solve the problem of releasing sick animals into the wild? If a raccoon is sick enough with canine distemper to be brought to a rehabilitator, any competent rehabilitator would recognize the need for euthanasia. Disease problems usually relate to rehabilitated babies who become sick from undiagnosed new admissions, that's when you have the potential for cross infection and epidemics if rehabilitating is not properly done and housing is not properly in place. Adult raccoons brought to, and released by, a rehabilitator would not negatively impact parvo concerns. As to the release of animals known to be sick into the wild, such conduct on the part of any rehabilitator is unconscionable. However, that does not logically lead to the conclusion that (1) That's the standard practice for competent rehabilitators or (2) It somehow justifies killing healthy adult raccoons brought in as adults. The response then mentions one report from a licensed rehabilitator that documents a parvovirus outbreak.

The outbreak mentioned took place at Wildcat Wildlife Center. The study mentioned possible failure of a vaccination protocol for parvo. However, the vaccine now recommended for raccoons is a mink vaccination with no failure history. Moreover, the study noted: Dog and cat vaccines may not provide adequate cross protection against raccoon or mink parvovirus, or there simply could have been a bad batch of vaccine or an undetected problem with vaccine storage. It may be that the sick raccoons had not had sufficient time to mount a suitable response prior to exposure to parvovirus in the environment.

Given the fact that I was using the same vaccines for years and never experienced an outbreak of parvo with my raccoons, I would suspect that the latter three possibilities not the first were causative regarding the Wildcat outbreak. Moreover, one outbreak of parvo in one county in one institution has no relation at all to killing all healthy raccoons and coyotes brought in as adults all over Indiana. It provides no rational basis for killing them. But it does raise another fearful specter. Is this response really in support of an ultimate plan to require extermination of all raccoons brought into rehabilitators, even babies, as suggested by one advisory group member in the February 20, 2009, minute meetings? The following is part of the rant on raccoons that passed for discussion, without any citations for support, in the minute.

F. The Advisory Group Notes and the Anti-Raccoon Sentiment Therein.

These comments are from the Advisory Group minutes of February 20, 2009: Raccoons - There are way too many (especially evident in Marion County)

-For district wildlife biologists, raccoons are the number one complaint.-A Purdue study on crop damage showed that raccoons were responsible for 60% of the damages to crops.-In terms of road kill, the number of raccoons is out of hand.- There should not be any treating of diseased animals.-No incidents of rabies in raccoons in Indiana, as of now. However, it does appear to be moving closer. -At certain clinics, baby raccoons are going

to be euthanized. This is to stop the nuisance spread and is up to the individual veterinarians. -Raccoons cause problems wherever they are released because they become nuisances.

-Rehab is only taking the animals out of the hands of the public. -If they are captured, they should be euthanized. There is no reason to rehabilitate. -Hoarding is a big problem with raccoons. -How are rehabbers getting the raccoons? Babies separated from their mothers. Most are orphans and they are all from the public. -Raccoons are egg predators. -Put caps on the number of raccoons released. -Limits on the number of individual rehabbers are good because this will limit hoarding and backyard releases. -Limit the number a facility can hold and limit the number of raccoon rehabbers. Many are ignoring permits there have been some direct violations of state and federal law. Many are making emotional judgments. Too many are not saying no, even when they are out of room. This could become a Dept. of Health issue. -Usually rehabilitators are given a time period to enact changes before license is revoked or denied occurs. -The number limited needs to be black and white. Over limits must say no or euthanize. A point of caution was mentioned here to be careful on how this would be viewed by animal rights groups. This group takes in about 100 per year and they euthanize if they are over limit. -Complaints- what happens when a facility is limited? Euthanize. -Comply with limitations or raccoons are euthanized. -Is there an option to sell fur of euthanized animals? This is commercial trade Will discuss at a future meeting

When you read these minutes it's clear to see that when it came to raccoons, few friends in this group could be found. One sentence in four pages stands out in favor of raccoons: As predatory animals, the landowners feel these animals are valuable additions to their properties. It was also mentioned that raccoons have a place in the ecology of Indiana. Although hoped that such speculation is erroneous, it does seem consistent with such a plan for raccoon extermination. These group minutes deem raccoons to be nothing more than nuisance animals. They seem to suggest initiating a desire for a broad extermination-based-on-species plan. And, in fact the findings of this group reflect a perfect example of exactly what the 21st Century article feared would happen: Reducing the appreciation for one of our species of wildlife to nothing but nuisance value just because humans could not learn to co-exist with them.

G. Panic about *Balysascaris procyonis*, the raccoon roundworm

The response continues with its disease concerns in that Raccoons can also carry a roundworm known as *Balysascaris procyonis*, which can be transferred to humans and domestic animals through the ingestion of infected eggs. Research from a professor at Purdue University has documented this parasite in Indiana raccoons

This is a non-issue, and I am at a loss as to how the DNR can argue that this is anything but a non-issue. If this infection risk is such a concern, why are there no reports of dogs dying from this roundworm? They eat animal feces all the time and should be coming into veterinarian offices afflicted with this constantly with all the raccoons out there. How about hunting dogs? Are they infected with this roundworm? What documentation of this? If so, aren't they also putting kids at risk? Furthermore, to my knowledge, not one single rehabilitator in the entire nation has been infected with this roundworm? Why not? For three months of the year, we clean-up raccoon feces day in and day out. Why no infections? Despite all of the emotional diatribes about this, I am only aware of 25 documented cases of human infection with this roundworm in the United

States thus far since the disease was recognized at least 20 years ago. Of those cases, not even one has been reported in Indiana. Although five deaths have occurred in total in the United States since the beginning of recording keeping for this worm, let's get some perspective on this: Around 5.4 million deaths a year are caused by tobacco, About 14,965 people die per year from drunk driving accidents, The CDC reports around 76,000 alcohol related deaths per year. According to Storm Data, a National Weather Service publication, over the last 30 years the U.S. has averaged 58 reported lightning fatalities per year, Ten to 20 people die every year as a result of dog bites in the U.S. By far, the majority of the victims are children, According to the International Hunter Education Association, approximately 1,000 in the US and Canada are accidentally shot by hunters every year with almost 100 each year resulting in death. And if the raccoon roundworm, which has caused five deaths since the start of recordkeeping, is such a serious risk, why is coon hunting allowed? Why are hunters allowed to take young raccoons and put them in a pen with a dog to be mauled to death in "blooding the pups?" Why are coon hunters allowed to shoot a raccoon out of a tree and let the hounds maul it to death? Without doubt, during these painful mauling experiences with fear and panic involved, these raccoons often lose bowel control and defecate, hounds get the fecal matter in their mouths then or by puncturing the raccoon's bowel and they are then exposed to the roundworm. Even if they don't happen to find and kill a coon, just by walking around in areas where raccoons defecate, they will be exposed. So they are at risk of becoming diseased. Since this roundworm can then be passed on to the coon hunter and his family members, it would only seem reasonable that this dangerous practice of coon hunting must be terminated immediately. If coon hunting is not to be terminated, then based upon the statistics cited, it would appear that dwelling upon the risks from the raccoon roundworm in Indiana is somewhat over-reactionary.

H. Panic About our Non-Existent Rabies in Raccoons in Indiana

The DNR then goes on about rabies: Raccoons can also carry rabies, of which there are different strains. The Centers for Disease Control and Prevention (see attached article) have stated that wildlife are now the principal disease vector of rabies in the United States.

If this is true, than a number of approaches need to be taken by the DNR, the least of which is killing healthy adult raccoons that can be vaccinated against rabies. Here are some rational things that can be done: First, recognize who would be most at risk from rabies in wildlife: Trappers. Rehabilitators are adults who generally take in baby animals. Baby raccoons have not been rabid in Indiana, and baby raccoons rarely bite. Most of the time, they don't have teeth when brought in. By the time they do, they have no desire to bite the hand that feeds them. Experienced wildlife rehabilitators often train newer rehabilitators as to how to avoid being bitten. Unlike trappers, they don't do things to animals, like intentionally stepping on them, to provoke them into biting. Moreover, they have them in a facility where they have equipment for proper restraint of the animals. In Indiana, we have had no cases of raccoon rabies in adult, juvenile or baby raccoons for the last 30 years. However, if the DNR feels inclined to play the rabies-scare card, then they must be prepared to protect those most at risk: The trappers. The following trapper manual is approved by the IDNR. Here's the page from Trapping of Wildlife in Chapter 14 on Running a Trap line: Special attention should be shown regarding several statements from this book. First, it includes those not legally permitted

to carry a firearm on the trap line due to age or other restrictions. .. Here the Indiana restrictions: You are not eligible if you have been convicted of a felony, have had a previous handgun license suspended, are under 18 years old (under 23 years old if a delinquent as a child), have been arrested for a class A or B felony, or have been arrested for any felony involving violence or the use of a deadly weapon. So children and felons cannot carry a gun, but nothing restricts them from beating an animal to death in a trap. In fact, the DNR apparently condones it. And children apparently can trap wildlife and be exposed to a potentially rabid animal in excruciating pain in a trap? An animal that will bite any chance it can get. Does this seem reasonable if there is a rabies risk?

So you have someone not competent to carry a gun. He or she is supposed to hit a thrashing, out-of-control animal in the back of the head with a heavy object. I have seen raccoons in pain and fearful. They won't just let you get behind them to hit them. These animals are being beaten to death. And if one bites the trapper, what can be sent to the lab? The base of the skull is the area of the brainstem--the exact part that should not be damaged in order to check for rabies. That makes the fact that trappers are being told to hit the animal at the base of the skull particularly troublesome and dangerous. If there is a risk of rabies in these animals, then no one under 18 should be trapping and killing these animals. In fact, no one at all should be trapping and killing these animals if that is the case. Even assuming you could get an animal "rendered unconscious" by a blow, it may not remain that way. Attempting to crush one with a foot on the chest seems the kind of thing that would provoke any animal into biting. So if the DNR is serious about a fear of rabies, no one should be allowed to hunt or trap any raccoons or coyotes or skunks particularly with dogs and without guns. It is way to risky for these trappers to be handling adult rabies vectors that could bite them.

Moreover, if there is a risk of rabies, what is the DNR doing to protect the public, and, particularly, the trappers and hunters that pay for a license? May I assume that this money from trapping and hunting is being directed into rabies eradication programs, as well it should be? How much money from the trapping and hunting fees is the DNR spending on oral vaccine drops on the Ohio/Indiana border? If not, why not? It has been proven effective and the proof is in the 2008 statistics and Dr. Gehrt's email to me. So why wait for the horse to get out of the barn before closing the barn door?

The DNR then states that furthermore, they (the CDC?) recommend that "stronger and more uniform federal and state wildlife regulations are necessary to prevent indiscriminate international, interstate, and intrastate movement and release of wild carnivores by private citizens."

Unfortunately, these rule changes applicable to rehabilitators do nothing to promote more uniform laws. Although uniform laws are needed as to trapped animals, it has little to do with rehabilitation. It is more relevant to those who allow animals to be trapped and held by trappers. I am aware of nothing in the rules that prevents trappers from moving these animals around or selling them out of state. Look at the penning issue for coyotes for a sad example of that. Moreover, this will drive rehabilitators out of rehabilitating leaving more good Samaritans to raise more animals illegally and release more animals illegally wherever they choose to release them.

The DNR then states, apparently based on the old 1999 that although the raccoon rabies strain is not yet in Indiana, it is in Ohio and has spread to the Cleveland area within recent years.

This statement is based on inaccurate and dated information taken from a 1999 study that has been rendered void by the 2008 study. And again, if Indiana really believed that rabies was on its way, then why is Indiana not doing vaccine drops as Ohio is to stop the spread of rabies? Why does it allow its sister state, Ohio, to bear all of the brunt of keeping rabies out of Indiana if such is a real fear? The DNR then speculates that it is anticipated that this strain will also reach Indiana at which time the Dept. of Health, BOAH, and DNR will have to deal with that rabies strain, which can affect human health.

Other than based on pure unsupported speculation, what can the DFW and the DNR point to that supports the contention that this strain will reach Indiana? What documents? What studies? The fact is the present studies do not support that idea at all. And, again, where are the bait drops? Why is Indiana not doing what it can to protect its citizens from this impending catastrophe? Why wait until the horse is out of the barn and halfway down the road? If this is a serious fear, where are the rabies vaccine bait drops? When will they be initiated? When will rehabilitators have access to them? When will all trappers be required to get pre-exposure vaccine since they routinely deal with rabies vectors in situations where they are most likely to be bitten? When will the DNR stop letting children trap and kill rabies vectors thereby being exposed to rabies? The DNR then throws in the kitchen sink of other diseases that raccoons can have such as raccoons can also carry leptospirosis and other parasites.

So do many other wild animals, and these are not new diseases. Must we kill them all? Why start now? The DNR then states that while some rehabilitators treat the raccoons in their care with vaccines for canine distemper, parvovirus, and rabies, none of these vaccines have been proven or documented to be effective for the treatment of these diseases in raccoons or other wild animals and are not labeled for use on wild animals.

With all due respect, I have no idea what studies the DNR officials have read to reach that conclusion. Again, the Galaxy D study proved the effectiveness of Canine Distemper vaccine in raccoons. The rabies vaccine drops have curbed the spread and diminished the incidence of rabies according to the 2008 rabies study. The Mink vaccine for Parvo has proved useful for raccoons in preventing parvo outbreaks according to many rehabilitators whom I have spoken to about parvo. Vaccines are not proven to always prevent disease in any animal, including humans. And if they are not properly stored, given according to protocol and not allowed to outdate, they are recognized by almost all veterinarians as effective for all species at least in theory. You will always have failures. But more likely than not, you will have far less disease in raccoons that are vaccinated by rehabilitators than in those that are not.

I have used Galaxy D. I had an outbreak of canine distemper several years ago brought in by one litter. Of the coons that I rehabbed, not a single one that had been vaccinated got canine distemper even though they had been exposed to some ill coons before the illness was diagnosed. Yet all of those exposed before they could be vaccinated got the disease and had to be euthanized. That's not just my experience--talk to other raccoon rehabilitators and they will tell you the same thing. It is effective for distemper in raccoons. Gertz studies and oral vaccine drops have stopped progression of rabies from Ohio to Indiana. Perhaps Indiana should start doing its part. Use trapper money to protect trappers. Allow rehabilitators to buy it for their woodlands and release areas. Do something about this other than singling out adult raccoons and county line borders, which have nothing at all to do with preventing progression of the disease.

Logical application of scientific reasoning would indicate that these vaccines are effective for all mammals. They should be used without any further delay. If raccoon rabies shows up in Indiana, the DFW and the DNR officials will have no one to blame other than themselves for their inaction in refusing to do bait drops.

The DNR then observes that the raccoon population in Indiana is at a high level with a large number of raccoons. I find this particularly troubling because when I had a veterinarian willing to neuter and spay my raccoons FOR FREE before they were to be released, to reduce the population, I was stopped in my tracks. My vet was threatened with loss of his license if he did it. It would appear, based on Dr. Frantz comment, that the DFW wants high populations of raccoons--they just want them only in the areas where they can be hunted and trapped and not in areas that inconvenience farmers and some suburbanites.

It's time for the DNR to start considering non-lethal means of population control particularly in urban areas and farming areas. Killing is not the only way to do it. And, as Dr. Franz said, it is not the best way to do it. It's not "bio-logic." It's unscientific. It just increases the population by causing increased fertility and multiple births. Injectable methods of birth control work. Gonatron works for boars. Why not do something scientific and progressive? Why not support contraceptives being formulated for raccoons? And even more importantly, why not allow rehabbers to spay before release? Why not take a lesson from the successes of the feral cat spaying projects? So what if it changes behavior? It won't change behavior for finding food--hunger is a great motivator. Besides, being dead changes behavior. After extermination, there is no behavior.

The additional explanations made merely reflect problems with overpopulation. Obviously, the breeders continue to breed raccoons for fur and the breeders and trappers contribution to the killing of 100,000 per year hasn't helped. Some could be concerned that the DFW will soon want all suburbanites to get a trappers licenses and be allowed to trap and kill all raccoons and coyotes that wander through their back yards. And why is the breeder program allowed at all if there's already too many? Perhaps we need to try something new like population control through spay and neuter or chemical contraception. Yet, the explanations go on and I now just summarize.

Raccoons are condemned for eating eggs, eating corn, getting into barns and chicken coops and generally troubling farmers. They get into attics and chimneys, some landowners consider them a nuisance.

Didn't raccoons always eat eggs? Don't farmers have any obligation to protect their chickens and ducks (as I do) from natural predators? Can't people keep their houses repaired so raccoons can't tear off rotted shingles to get into an attic? A raccoon's instincts make her see a chimney like a tree. If she can get in it, she will. What's the problem with using chimney caps? Don't people have some responsibility to adequately protect their property and co-exist with wildlife? Isn't the DNR supposed to be on the side of wildlife and promoting co-existence rather than species extermination in certain parts of the state? And weren't the raccoons here long before the suburbs and farms existed? Instead of labeling raccoons and coyotes as "nuisances" and encouraging exterminators to kill them, why not use non-lethal methods--methods that would promote the DNR's public image. As to the Wildlife Conflicts Hotline taking 1,000

calls related to raccoons, isn't that what it's for? I have provided the initiating statutory language. The DFW adds this:

The statutory authority for the DNR Division of Fish and Wildlife in IC 14-22-2-3 is to: 1) Provide for the protection, reproduction, care, management, survival, and regulation of wild animal populations regardless of whether the wild animals are present on public or private property in Indiana; and (2) Organize and pursue a program of research and management of wild animals that will serve the best interests of the resources and the people of Indiana."

The DNR is also required to develop rules that are based upon

- (A) The welfare of the wild animal,
- (B) The relationship of the wild animal to other animals, and
- (C) The welfare of the people in IC 14-22-2-6.

The DNR is not required by law to save every single animal. I placed in bold parts of the statute that the DNR seems to ignore or forget--the parts about protecting the wildlife. It is true that the DNR is not required to save every animal. Nor is it required to make every animal available to a trapper for its fur. Wildlife rehabilitators should have the opportunity to enjoy the wildlife by saving those individuals that the DNR deems so insignificant. No one is requiring the DNR to save every animal. However, they need not kill them needlessly thereby preventing rehabilitators from rehabilitating them. Raccoons and coyotes create problems for thousands of Hoosiers each year, in addition to posing a significant disease threat. The fact that raccoons are continuing to behave as they have for thousands of years is not a valid reason to now label all raccoons not in a trap as a nuisance. It is not a valid reason to exterminate all of them not living in an area where they will be trapped for fur. The DNR can use other options. Moreover, this is repetitive. There is no proof at all of a significant disease threat. If so, the DNR needs to suspend trapping and coon hunting right now. The Principles of Wildlife Rehabilitation by the National Wildlife Rehabilitator's Association states, "the animal with a terminal illness or fatal injury deserves the best treatment we can give them. We have no right prolonging that animal's pain or discomfort by attempting other treatment or even allowing the animal to die without our assistance."

I am a member of the NWRA. This is an offensive misconstruction of the meaning of this statement. I fail to see how this statement, in any way, justifies exterminating healthy animals. In fact, it specifically limits what animals are appropriate for euthanasia to "the animal with a terminal illness or fatal injury." So how about we limit the killing language to call for euthanasia of "all animals with a terminal illness or fatal injury" rather than "all adult raccoons must be euthanized." Attempting to use this statement from the NWRA to justify killing healthy animals is a complete distortion of the intent and clear meaning of the words. The Explanation goes on: In an article in Wildlife Journal, Vol.12, No. 4 on rehabilitation of the raccoon, it states, "The numbers of raccoons released in a given area should be tightly controlled so that their impact on the area is minimized." The administrative rule governing wild animals taken by licensed nuisance wild animal control permit holders already requires that the animals be released in the county of capture or be euthanized. The DNR will be reviewing the nuisance wild animal control permit regulations later this year to determine what changes need to be made to the release of raccoons and other species taken in these situations.

Please do not compare rehabilitators to wildlife exterminators. It's like comparing adoption agencies to abortionists. Exterminators get paid very well for what they do. Rehabilitators spend a lot of money and receive no monetary gain. More likely than not, they already kill most of the animals they trap. Given the attitudes reflected by the DNR thus far about raccoons, one could fear that it next will be working on rules compelling exterminators to kill all captured furbearers. Even worse, perhaps they plan to encourage the exterminators to trap and kill more by giving them a financial incentive to kill: Allowing them to sell the fur. Or maybe, given how little the DNR cares about raccoons and coyotes, they will allow Indiana raccoons to be sold live across state lines to be mauled by dogs as Indiana coyotes have been.

This is not a problem for exterminators. What they do has no relationship to what rehabbers do. We work for free, and spend a lot of money each year on vaccines, food, and shelter for us; it's all about caring about our wards and enjoying the commonly-owned wildlife. To them, it's just a business it's all about the money. To us, we care about the animals. They, in most cases, don't care if the animals live or die and, if it's financially advantageous, prefer them dead.

CONCLUSION: One could logically conclude that this isn't about the DNR fearing for the health and comfort of wildlife in the hands of rehabilitators. Why would they really care when they routine condone killing of wildlife by hunters and trappers? Moreover, as far as I know, the DNR does not check as to the welfare of raccoons held by trappers to grow a better fur quality during trapping season. They still allow coon hunters to carry a handgun which they can, and do, use to shoot coons out of trees to be mauled to death by dogs. If the DNR is worried about the suffering of wildlife, care rendered by rehabilitators should be the least of their concerns. This seems more about not wanting any raccoons in the hands of rehabilitators period.

This isn't about too many raccoons or coyotes, either. It's about too many raccoons being in areas where they are a "nuisance" to landowners who have no desire to co-exist with our wildlife. It's about too many raccoons living in areas where they are managing to avoid the trappers' traps and the coon hunters' hounds. It's about exactly what the 21st Century article talked about and feared: Not fostering co-existence and relegating species of wildlife to the status of "pest" and "nuisance."

But civilization is progressive. The French no longer hang cats in a bag over a fire in Paris for entertainment. Dog fighting and cockfighting have been banned. We have laws against torturing puppies and kittens and other pets. Progress is being made toward making factory farming less cruel. And the time will come, with or without the DNR leading the way, when wildlife like raccoons and coyotes will be protected, not scorned. I hope that I live to see that day in Indiana.

Kandace Voyles, LaPorte, IN (June 8, 2010)

I agree with some things that are being proposed such as the time restriction on how long the facility can hold the animal during recovery, it is essential for the animals to remain wild in order to return to their natural habitats and with prolonged and excessive exposure to humans the animals would lose their natural fear of us. On the other hand I don't believe rehabilitation facilities should be releasing animals during the hunting season. Most animals are released before they are fully healed and it becomes a waste of effort on the care takers part to have the animal shoot after weeks of work. I do no several hunters

personally who hunt close to rehab facilities that release deer in hopes for an easy kill. Most of them coming home with a kill each time they use those locations. I understand the concern of the animals becoming tame, and disease possibly being transmitted between them, but there is no point at all if the animal is immediately killed after being released.

Tracy Swiderski, La Porte, IN

Please reconsider your rules. Give the class, for free, to the people who have paid for these licenses. Also, some pets may need more nurturing, allow a case by case length of care.

Jennifer McFerron, La Porte, IN

What in the world is the matter with the DNR? Making it more difficult if not impossible for wildlife rehabbers to do their (unpaid/volunteer) job just so hunters can get better and easier access at young animals. Shame on all of you.

Laura M. Nirenberg, La Porte, IN, Wildlife Orphanage, Inc. (Email: June 14, 2010)

I felt compelled to submit another comment regarding the wildlife rehabilitation rule revisions after reading Ms. Petercheff's recent statements in the local newspaper. (Please see the Michigan City News Dispatch article pasted below). Linnea's comment regarding "imprinted" wildlife speaks volumes to DNR's lack of knowledge surrounding how properly rehabilitated animals behave. In fact, if DNR is truly concerned about animals approaching people for food, etc., they should seriously rethink the rule revisions as proposed. What Linnea describes is not characteristic of a properly rehabilitated wild animal. In fact, it is indicative of animals that are released prematurely and/or never provided an opportunity to socialize with others of its kind. This typically results from well-intentioned individuals who happen upon an orphaned animal and end up raising it themselves when an experienced rehabilitator cannot be located.

I have been rehabilitating wildlife for 16 years and in my experience, properly rehabilitated animals do not turn to humans for assistance once released. Unfortunately, the DNR is never privy to these stories because they aren't stories! Animals that are provided enough time to mature properly "both physically and mentally" and slowly acclimate to their surroundings in "family" groups not only avoid people but also tend to avoid the roadways which can be a danger to themselves and the public. The county of origin rule is especially problematic for social animals that rely heavily on newly formed family bonds for security. The saying, "there's safety in numbers" has never been more appropriate than in this context. Rehabilitators work diligently to team up animals of like age and maturity levels to make for a smooth transition once released. These friendships cannot be based on perceived counties of origin. ("Perceived" because there is no way to determine with any certainty where these animals actually come from.) The language in the most recent version of the rules is an improvement, yet still fails to provide feasible options to rehabilitators. Including language to provide for release in the "county of suspected origin, county or rehabilitation or one adjacent to either county" will provide some much needed flexibility.

Again, I must also urge you to consider extending the holding period to 240 days. Keeping these animals longer does not make them more imprinted on humans when done

correctly. In fact, it's just the opposite. Pulling away from their caretakers is exactly how a wild animal communicates that it is time for them to be released. Forcing them out too early simply because of some arbitrary calendar date is counterproductive and conflicts with everything DNR publicly claims it is attempting to protect the public from. Granted, 240 days is also an arbitrary number; however, in my experience, I have yet to see a releasable mammal require more than eight months.

Forcing experienced people out of the wildlife rehabilitation field by adopting rules that mandate irresponsible practices that jeopardize the well-being of animals is not the answer. Thankfully, many citizens of this state are incapable of turning a blind eye to the suffering. These same individuals, when unable to find a suitable, safe place for these animals, will often raise the animals themselves. As eloquently stated in a comment posted by "AL" to an article published on this issue in the La Porte Herald-Argus, "The idea that the state government, or one of its agencies, needs to interfere with people who take care of wildlife out of respect for life is as offensive to me as any of the overzealous government intrusions that are harped upon in the commentary pages of this site. Sometimes, I think, government regulations are the direct result of an agency's need to justify its existence. I, for one, will practice civil disobedience in regard to unnecessary regulations." This position is not unique.

Interestingly, Mrs. Petercheff conveniently refrained from commenting about the Indiana deer that tested positive for TB in Indiana last year. In fact, fingers were pointed to other states, yet there was no mention of taxpayers footing the bill for \$86,000+ to depopulate Indiana herds. She also avoided any conversation with the reporter about the unfortunate taxpayers in Franklin County who were forced to cough up \$35,000+ to cover the expense for additional TB testing—a figure that is sure to increase and does not include the costs imposed on the other counties where TB was located. What is most important to stress here is that none of the 3 deer that tested positive were found in a rehabilitator's backyard, but rather all came from deer farms or canned hunt operations.

I have spoken with many people including licensed rehabilitators, veterinarians and conservation officers about these proposed rule changes. Although everyone certainly has a different opinion and perspective on how best to care for animals in need, there is one consensus "these rules as written beg for transgression and are completely unenforceable. The public not only wants this service, but will continue to take matters in their own hands to assist these animals when necessary. Driving experienced rehabilitators out of this field with ill-conceived rules is counter-productive and will again, not only expose the public to more animals but circumvent everything the DNR publicly claims it's trying to protect against. In fact, New York tried it years ago. It was a dismal failure and had to be repealed to allow for rehabilitation again. Indiana should learn from their mistake, not repeat it.

By Matt Fritz, Staff writer, 1-866-362-2167 Ext. 13887, mfritz@heraldargus.com, Published: Tuesday, June 8, 2010 3:07 AM CDT La Porte "La Porte County residents providing rehabilitation services for orphaned or injured wildlife may soon face tougher rules from the state, and some are stopping their services because of it. Last month, the Indiana Natural Resources Commission gave tentative approval to a series of rules governing wild animal rehabilitation permits. These changes made by the Department of Natural Resources (DNR) include enforcing a hold limit of no more than 180 days on all animals (unless permission is granted from the DNR), requiring mandatory reference materials for rehabilitation centers, requiring providers to take an 8 hour rehabilitation course every three

years (sponsored by the DNR), to release animals only into their county of origin (unless it's unknown), prohibiting public displays of rehabilitated animals and forbidding the housing of rehabilitated animals with other wild or domestic animals. Other changes include the requirement to have clean and sanitary enclosures, humane euthanasia for injured animals and release quotas.

Laura Nirenberg, founding director of the Wildlife Orphanage in La Porte, said she has stopped rehabilitating deer because of the proposed rules. Her Wildlife Orphanage has specialized in the handling of deer, foxes and raccoons. The three most problematic areas, she said, were the 180 day maximum holding period, the requirement to release animals into their county of origin, and the eight hour course. For the 180 day rule, Nirenberg said she wanted an extension for another 60 days.

"Upon first blush (the 180 days) seems quite fair because most(wildlife) can be properly cared for in a six month period," she said. "But often times we don't get the cream of the crop. They've gone through extraordinary trauma sometimes. So it doesn't always work as quickly as the DNR hopes." And for deer, Nirenberg said she believes the rule's purpose is to release them in time for hunting season. Although the 180 day rule has been imposed before, she said she was able to get an extension for hunting season. The new rules would not allow for that. Rehabilitator Jacqueline Molden, who is also Nirenberg's mother, agreed, explaining that one year hunters actually built hunting stands on her property for the apparent purpose of shooting down the fawns after they're released. That year she was able to get an extension from the DNR. "I'm not a veal farmer," she said. "I'm not a canned hunt. At least a canned hunt gets paid for providing these walking targets." Molden said she was providing a free, invaluable service to the area, but didn't see the point of spending her time, and money, rehabilitating a deer only to have a hunter kill it right after it's released.

Linnea Petercheff, operations staff specialist for the DNR, said this rule was established years ago to limit the risk of captive, wild animals contracting parasites and diseases, or getting treated as pets, both of which would result in lower survivor rates in the wild. She did note that severely injured animals could be kept longer (allowances have also been made for animals rehabilitated during winter). "The longer it's fed by humans the more acclimated it will become to humans feeding it," she said, "and the more of a problem it will be for humans down the road because it thinks humans will supply it with food. It will not have the same fear of humans and will come to them (or their property) to eat."

In regards to releasing animals in their county of origin, Nirenberg said, first, it's hard to tell the county of origin because an injured or orphaned animal often changes hands several times before arriving at her door. And, second, once she gets it, she tries to socialize it with other animals of the same size (which is also prohibited under the new rules) so they can be released together to improve their survivability. She also noted that people raising deer as game don't have to face these regulations. "So to then break these animals up because one came from Lake and another from Porter County will not only compromise the survivability of the animal, but we have to remember who goes where and it's impossible for the DNR to enforce unless we tattoo them or mark them with a microchip."

She said for these reasons she has refused to take in anymore deer, and has limited the amount of raccoons and foxes she helps. But Petercheff said the DNR introduced these rule to inhibit the spread of sickness in deer populations from county to county, such as chronic wasting disease (which has been found in Illinois) and tuberculosis (once found in Michigan). And in regards to game farmers, she said they don't face these regulations because they don't release their animals back into the wild. She also noted that they still have to check their animals for disease. And Nirenberg had concerns about the 8 hour required course work because the DNR currently doesn't offer them, and the ones that are offered aren't free and often don't cover the animals Nirenberg handles. Petercheff said it is true that the DNR does

not currently offer these classes, but said it will have to offer them free of charge in every area of the state (but not every county) if these new rules are passed.

This is the fifth draft of the new rules. Previous drafts forbidding rehabilitators from sharing electronic pictures of their animals, or requiring them to exterminate any adult raccoons or foxes in their possession, have since been revised to discard these rules. Nirenberg said rehabilitators have never been invited to a commission meeting, but said they were allowed to send comments and questions to the commission online.

Petercheff said the final rule changes could be approved as early as November or as late as next January. Indiana has 161 licensed wild animal rehabilitators who devote their own time and resources to nursing back to health a menagerie of wild animals, including such diverse species as raccoons, deer, ducks and turtles. Interested parties can review and make comments on the proposed rules at www.in.gov/nrc/2377.htm. —The Associated Press contributed to this report.

Jackie Molden, La Porte, IN, Wildlife Orphanage, Inc. (Email: June 24, 2010)

I felt compelled to comment after reading statements made in the article changes afoot: Wildlife rehabilitators may face new rules. The comments regarding imprinted wildlife speak volumes to the Indiana Department of Natural Resources' lack of knowledge surrounding how properly rehabilitated animals behave.

In fact, if the DNR is truly concerned about animals approaching people for assistance, they should seriously rethink the rule revisions as proposed. Properly rehabilitated animals do not turn to humans for assistance once released. Animals that are provided adequate time to mature properly and are slowly acclimated to their surroundings in family groups not only reject people, but also avoid roadways, which can be a danger to themselves and the public. The wildlife behavior described by the DNR spokesperson is indicative of an animal that is released prematurely and/or never provided an opportunity to socialize with others of its kind. This typically results from well-intentioned individuals who find an orphaned animal and raise it themselves when a rehabilitator cannot be located.

The transmission of wild animal disease is a valid concern although not accurately attributed to rehabilitators who routinely vaccinate and monitor animals for months prior to release. Not surprisingly, the DNR conveniently refrained from commenting about the true culprits behind wildlife diseases and the Indiana deer that tested positive for tuberculosis in 2009. There was no mention of taxpayers footing the \$81,000+ bill to depopulate Indiana herds, nor any comment made regarding Franklin County taxpayers who were forced to cough up \$31,000+ for additional TB testing.

What is important to stress here is that none of the deer that tested positive were found in a rehabilitator's backyard, but rather, came from deer farms or canned hunt facilities.

Despite this serious health risk, canned hunting operations continue to evade any meaningful regulatory rule enforcement while the DNR focuses its attention on alleged rogue rehabilitators. Ironically, the DNR has repeatedly asserted publicly that there is no need for wildlife rehabilitation as many of the animals cared for are disease-ridden and overpopulated. Conversely, this agency licenses game breeders who breed these same species in captivity. The DNR does not attempt to reconcile this diametrically opposed position. It also routinely dodges questions about how game breeders are capable of evading any stringent rule revisions.

I have spoken with many licensed rehabilitators, veterinarians and conservation officers and understandably there are differing perspectives on how best to care for wild animals in need. There is one consensus, however, and that is that these rules as written beg for transgression and are completely unenforceable. The public relies heavily on this service and will continue to take matters in their own hands to assist when necessary. Forcing experienced rehabilitators out of this field with ill-conceived rules is counter-productive and circumvents everything the DNR publicly claims it is trying to protect against. In fact, New York banned rehabilitation years ago. It was a dismal failure and had to be repealed. Indiana should learn from their mistake, not repeat it.

CeAnn Lambert, County, IN, Indiana Coyote Rescue Center (July 13, 2010)

I support the change in the rehab rules, but would like to suggest that coyote puppies that are kept together at a rehabbers all be released in the county of origin of one of the puppies. I feel this would give the puppies a better chance of survival. According to the CDC, rabies is not an issue in coyotes, also Echinococcus should not be an issue for people as long as the people do not eat coyote feces. As far as other diseases go, including distemper and parvo, the coyotes are usually kept until Sept. before they are released; the issue of them being ill with disease is not an issue. In fact, healthy coyotes being released into the wild should have a positive effect on the resident population. Maybe a vet could inspect them before release.

Pat Knight, Plymouth, IN (July 19, 2010)

In reference to rule #LSA permit holder must maintain current records for each wild animal to include the following: (4) States: "The treatment, including the identification of and date of administration of any pharmaceutical product or other chemical provided to the animal while in captivity." Since songbirds/perching birds, ie., robins, blue jays, bluebirds, warblers, swallows etc., are neither hunted, nor consumed by people, tracking antibiotics, anti-fungals, or anti-toxins administered to these animals is of no value for public health. I would like to ask for an exemption for tracking this information for songbird rehabilitation.

Commentor Name Jason Schmiesing
Commentor County 38
Commentor State IN
Commentor City Portland
Commentor Organization
Commentor Email [Email Commentor](#)
Comment I am against the coyote rehab.

The Coyote population is increasing and so are the problems associated with them.
<http://varmintal.com/attac.htm>

These attacks that are being reported across the country and in our own state will increase with the coyote population and now you are proposing to feed and care for them and turn them back loose when they have been rehabed to not fear the human presence.

I do believe in rehab for other types of animals but not for the ones that will attack my children, myself, anyone else, or their children.

I pray this will not be allowed!

Thank you,
Jason Schmiesing
Time stamp

Commentor Name Christopher M. Skaggs
Commentor County 31
Commentor State IN
Commentor City Corydon
Commentor Organization
Commentor Email [Email Commentor](#)

Comment NO REHABBING COYOTES!!!! PERIOD!!!! As a lifetime hunter and trapper I've seen the damage that coyotes do the other wildlife around my area. Not to mention that there are so many coyotes already. Rehabbing coyotes is wrong! We don't need anymore running around. This is ridiculous to even think of letting individuals rehab an animal that is a pest to begin with. My neighbors and I have lost dogs and farm animals to these animals over the years. Not to mention the wild turkey chicks and deer fawns that are taken every year. They need not be reintroduced after being around humans, they'll associate humans with food and I for one don't want my daughter outside eating a hot dog becoming a rehabbed coyotes next meal. In other parts of the country coyotes are pests, ever wonder why? Indiana has more important things to worry about than rehabbing injured wild coyotes, of this I'm sure. Don't give in to animal rights activists. This is a no-brainer, coyotes that are injured should be humanely euthanized and not even considered being rehabilitated. Thank you for your consideration in the matter.

Time stamp

Commentor Name Ryan McDuffee
Commentor County 47
Commentor State IN
Commentor City springville
Commentor Organization Indiana Hunter
Commentor Email [Email Commentor](#)

Comment I am opposed to rehabing animals that are considered varmits/fur bearers. The rehabilitation centers are essentially making money off of Indiana's wild life and that has been proven to be a consideration in other ventures that have been outlawed in the recent past.

All wildlife found in injured or sick conditions should be put down immediately, unless it is endangered or threatened.

Time stamp

Commentor Name jack corpuz
Commentor County 49
Commentor State IN
Commentor City indianapolis
Commentor Organization private citizen
Commentor Email [Email Commentor](#)
Comment Fully support the agency in regulating the wildlife rehabilitators.

Jack Corpuz
Time stamp

Commentor Name David Engelking
Commentor County 41
Commentor State IN
Commentor City Nineveh
Commentor Organization

Commentor Email [Email Commentor](#)

Comment There should be no coyote rehabilitaion allowed; period. This is an unsafe practive as it allows coyotes to associate humans with food. We already have a coyote problem as it is. We don't need these animals running through every neighborhood in the state looking for handouts from people, because that is what happened to them in rehab. Also, how is it legal for a private citizen/company to make money off of Indiana wildlife, when it has been said the wildlife in Indiana belongs to all citizens residing here.

Time stamp

Commentor Name Tim Rose

Commentor County 3

Commentor State IN

Commentor City Columbus

Commentor Organization Fur Takers of America

Commentor Email [Email Commentor](#)

Comment Please tell us the benefit of rehabbing coyotes. If there are none (which we do not believe to be any) then rehabs should not be able to do so.

We have a coyote population problem here in Indiana. This predator has had bounty's placed on them, year round taking without permits and are shot from low flying planes in many parts of the country. Some of this is done at taxpayer expense.

Coyote bounties have been considered by quite a few Indiana legislators over the years. A program does not exist at this time, but if it ever does it may come from the taxpayer.

We as Indiana taxpayers & outdoors men do not want money coming out of our pockets for coyote control. The goal of a rehab is to "release" these coyotes when able, but a few rehabs are turning these coyotes into fund-raising tools for their gain. The Indiana coyote rescue is a good example with the "Donate now" button at the top of their site. You can even "adopt" a pet coyote per website if you pay them a fee. These coyotes are the citizens coyotes, not the rehabs tool to make a prophet.

Many pics of "pet" coyotes lounging in the living rooms, people hugging them, etc. are just a click away.

These coyotes are not being rehabbed for release.

Please put an end to this practice as it will only end in a bad way as seen in the news with ever more present coyote attacks.

The coyotes that do get released are a threat to our Indiana children and elderly.

Please consider removing the coyote as a rehab animal and do the right thing for the citizens of Indiana as you have done in the past.

Respectfully,

Tim Rose

Indiana State Org. Fur Takers of America

Time stamp

Commentor Name Susan Davis

Commentor County 53

Commentor State IN

Commentor City Bloomington

Commentor Organization WildCare Inc.

Commentor Email [Email Commentor](#)

Comment Indiana Natural Resources Commission

Re: 312 IAC 9-10-9

As Raccoon Team Leader for WildCare Inc. located in Bloomington, Indiana, thank you for the opportunity to continue to have input in the proposed Department of Natural Resources Rehabilitation Permits for Wild Animals. The bulk of the changes are welcome bench marks for insuring the qualifications of rehabbers, the care of wildlife, and standards for education animals.

However, I have strong objections to section (n) on release of mammals which states that certain mammals, including raccoons, must be released in the county from which they were originally found or obtained.

WildCare takes about 65 raccoon cubs a year from our local animal control officers, the DNR, the county sheriff, and Finders from our own county as well as other counties without raccoon rehabbers. Most of these

officials privately shake their head when we tell them of this possible rule change because they know they are headed toward a public relations nightmare. Not even hunters can kill these adorable cubs that broke from the bear family over 50 million years ago, so imagine a Finder hearing one that is crying at the bottom of a tree because mom didn't come home, and she's so hungry she threw herself out of the safe tree nest.

Please consider substituting in the county of origin of one of the animals, or within a 50-mile radius of the county of origin, so we can support our law enforcement agencies and Finders with no other options. Finders tell us repeatedly that their local shelters will either not take raccoon cubs at all, or they will kill them if they do. Our own local shelter decided to kill all wildlife, which is why there is a WildCare. Since 2001 we have taken over 11,000 wildlings that got in the way of our cars, our chemicals, our pets, and our new homes. Over 90% do not come to us as the result of natural causes. A radius of 50 miles also would allow us to maximize our caging, which can hold up to 8 cubs per NWRA standards as well as foster the important family-building for raccoons, which keeps them referencing each other instead of the caregiver. It also increases their survival chances. Studies by the Humane Society of the United States show that relocated single raccoons survive only a short time. This proposed rule would set up singletons for certain death as our clans are built as soon as they come in. We don't have a cage for each county, nor would it work. Each clan has a worming and vaccination schedule that happens all at the same time and is age sensitive.

Since our raccoon orphans are typically with us up to 3 months, disease concerns are not relevant. Further, our cubs are vaccinated for distemper and canine parvo according to best practices. There is no approved rabies vaccine yet. It has been proven in other states that when Finders do not find help, they go ahead on their own without training whether or not it's legal and whether or not it's a health risk, but a huge concern with that is raccoons require a rigorous worming protocol when around people and their pets. I would point out that 80% of our Indiana raccoons carry this roundworm. Finally, with the potential of a rabies outbreak, we should be working hand in hand for the most accurate records. Finders are more likely to cooperate with reasonable guidelines. We were the first in our community to correctly identify West Nile in a sick blue jay and hand it over to our health department.

Please reconsider this part of the proposed regulation changes.

Thank You,
Susan Davis
WildCare Inc. Executive Director
Raccoon Team Leader
Time stamp

Commentor Name Jennifer Cunningham
Commentor County 53
Commentor State IN
Commentor City Bloomington
Commentor Organization WildCare INC
Commentor Email [Email Commentor](#)
Comment Indiana Natural Resources Commission
Re: 312 IAC 9-10-9

As Deer Team Leader for WildCare Inc. located in Bloomington, Indiana, I thank you for the opportunity to comment on the proposed rehabilitation changes. I totally support the new standards for continuing education as it will ensure the best practices for the wildlife entrusted to us by Indiana citizens.

However, I have strong objections to the section on release of mammals in (n) which states that deer must be released in the county from which they were originally found or obtained.

Monroe county borders six other counties and because there are no deer rehabbers near Evansville, we even took five from them this year. Although most of the fawns we take in are from Monroe, Lawrence, Morgan, Greene, and Brown counties, we take them as they are presented to us from county sheriffs, DNR officers, and Finders. Once we reach our capacity of twenty, Finders are redirected. The fawns are raised together to form the herd bond so important to their survival, especially since they will be yearlings without a doe that first winter. They will need to learn from each other. If this rule takes effect, then we will have to sort by county and release singletons, which is irresponsible. Far better that you allow us to continue to take

advantage of the Owen County site on private property of over 100 acres we have developed away from people and roads, where they are supported and protected.

Please consider a radius of 50-100 miles from point of origin instead of the artificial county borders, so we can support our law enforcement agencies. People do not want to watch dogs chasing an orphaned fawn to exhaustion or hear one bleating for days as it starves, home owners want a measure of comfort when they hit one with a bush hog (even if it's euthanasia), and school bus drivers don't want to pass one that was crippled by a car and can't even get up. They want to be able to take it to a rehabber where there is a compassionate outcome. One elementary school went together to bring us orphaned twins and then they followed the progress all summer. Parents were called, parents came to get carriers, and parents brought them to us and left checks. Think what kind of message it sends when government agencies have to tell people there is no redress.

Please reconsider this part of the proposed permit regulations.

Thank you,
Jennifer Cunningham
WildCare Inc. Center Manager
Deer Team Leader
Time stamp

Commentor Name carole riewe
Commentor County 71
Commentor State IN
Commentor City south bend
Commentor Organization owl acres
Commentor Email [Email Commentor](#)

Comment —I have been a licensed raptor rehabilitator for 20 years and am speaking in favor of adoption of the proposed rehabilitation amendments. Indiana is woefully behind many other states in regard to what it requires for its rehabilitators and this proposal is a positive step toward correcting that deficiency. One of the biggest positive steps is the requirement for continuing education. Eight hours in a three-year time span is certainly not too little! Biological research, dietary requirements, and medical pro-ocols are ever-changing and a rehabilitator who does not keep updated is worthless to the animals he/she handles. A core group is currently working to establish a state organization, which for a small \$30/year membership fee, will provide a venue for rehabilitators to network with one another and receive education from veterinarians and other experts in their fields. Some of us have heard negative comments from rehabilitators regarding continuing education and, to be blunt, some of the critics are those who are in most need. Continuing education will not be an expensive proposition involving travels to inconvenient locations but, rather, something that will be garnered close to home and greatly enhance the rehabilitator's ability to provide quality care. Please give these proposals careful thought —they are desperately needed. Thank you.

Time stamp

Commentor Name barry taylor
Commentor County 53
Commentor State IN
Commentor City bloomington
Commentor Organization
Commentor Email [Email Commentor](#)

Comment the requirement of releasing animals in the county of origin is unrealistic and counter productive. If you find a fawn in marion county (indianapolis) should it be released in the city on it's own or in the country where it will be relatively safe and be able to interact with a herd.

When younger, we were given baby rabbits by my grandparents to raise and release in the country. Should we have released them on Meridian street where they were found. This requirement is unrealistic. The rehab centers are the best judges of where to release the rehabilitated animals. The folks who run them are a part of the area day in and day out. While a lot of the new proposals are good, this one is not. Please do not include this requirement in your proposals.

Time stamp

Commentor Name carole riewe

Commentor County 71

Commentor State IN

Commentor City south bend

Commentor Organization owl acres

Commentor Email [Email Commentor](#)

Comment This is one more request to allow the continuing education regulation to be adopted. Eight hours in three years should not be any problem to anyone who rehabilitates wildlife. Actually, eight hours in ONE year is not too much. Medical protocols change, as well as nutritional findings and other pertinent research, and deliberately turning one's back on the current information is the mark of a narrow closed mind.

Unfortunately, some of those who have vigorously protested this regulation, and we are not unmindful of who some of them are, are people who NEED this education. If your mission statement is to be watchful of Indiana's wildlife, you will support this regulation as a necessary thing. Thank you for your attention to this matter.

Time stamp

Commentor Name Patti Reynolds

Commentor County 7

Commentor State IN

Commentor City Nashville

Commentor Organization Return to the Wild, Inc.

Commentor Email [Email Commentor](#)

Comment I don't understand or agree with the opposition to continuing education as represented in the regulation update. It seems a bit arrogant or ignorant or perhaps both. We all need to look beyond our specialties and comfort zones to be better rehabbers. One good example of need is that IWREN (Indiana Wildlife Rehabilitators Education Network - new Indiana organization for rehabber education and networking) people who only do transport have asked for a special class on how to safely handle all types of animals to get them into containers and to the appropriate person - some might even need to know how to hold overnight in extreme cases - what rehabber shouldn't really be required to have this info? One or two classes over 8 years is a bare minimum and there really is no reason to not show that you have expanded your knowledge as a way of being dedicated to your work and that you are able to help out other centers..

I really believe we need to include this requirement--it at least forces people to be exposed to other information. Just because someone has been doing something for years does not mean that they can't learn about new and maybe better techniques, food sources, enrichment for education animals, triage for species not normally handled - etc. I don't even know who the objectors are, but it seems to me that to protest this requirement raises questions regarding willingness to prove qualifications and to help share responsibilities and reputation statewide, and raises questions regarding professionalism. The arguments of expense and time are removed by the schedule and arrangements that IWREN and the DNR are trying to put in place for people to easily meet this requirement through free or minimal cost workshops locally without having to travel to major conferences.

Time stamp

Commentor Name Anita Bailey

Commentor County 8

Commentor State IN

Commentor City Delphi

Commentor Organization

Commentor Email [Email Commentor](#)

Comment I would like to see continuing education as a requirement for all wildlife rehabilitators. I think it is important for the health and safety of the animals that we care for to have the latest and correct information. This education would be beneficial for new and experienced rehabilitators.

Time stamp

Commentor Name Elaine Yarde

Commentor County 53

Commentor State IN
Commentor City Bloomington
Commentor Organization
Commentor Email [Email Commentor](#)

Comment Please reconsider the rule to release wildlife only in the county from which they came - a 50 mile radius would be a better solution. Deer, raccoons and foxes/coyotes, when orphaned, need to be raised in herds/clans/packs to ensure their survival when released back to the wild. Releasing a single animal into the wild is not a viable option.

Time stamp

Commentor Name Elva James
Commentor County 79
Commentor State IN
Commentor City Lafayette
Commentor Organization
Commentor Email [Email Commentor](#)

Comment Rehabbers need to be required to have training, and be required to be permitted and be tested. Too many unqualified persons try to provide rehab services to wildlife and so improperly and cause unnecessary suffering and death in our wildlife.

Time stamp

Commentor Name Anita Bailey
Commentor County 8
Commentor State IN
Commentor City Delphi
Commentor Organization
Commentor Email [Email Commentor](#)

Comment I would like to see testing and continuing education as a requirement for all Indiana Wildlife Rehabilitators, regardless of their years of experience. Please allow us to release juvenile mammals in their "family groups" from rehabilitation. Releasing a single juvenile mammal back to their county of origin would be detrimental to the animal.

Time stamp

Commentor Name Lora Lewis
Commentor County 7
Commentor State IN
Commentor City Morgantown
Commentor Organization
Commentor Email [Email Commentor](#)

Comment Please make sure all animal rehab persons take a test to be licensed and do not grandfather people in and please animal groups to be released together and not released singly in areas where they were rescued.

Time stamp 56/02/2010 10:56:03 AM

Commentor Name Kathleen M. Hershey
Commentor County 3
Commentor State IN
Commentor City Hope
Commentor Organization UTOPIA Wildlife Rehabilitators
Commentor Email [Email Commentor](#)

Comment To Whom it May Concern:

I am a biologist and State and Federally licensed wildlife rehabilitator, and I was part of the committee involved in the rewriting rehabilitation permit regulations. During that time, we made the recommendation that wildlife be released in the original region where it was found. This was the quickest and easiest way to assure that epizootic diseases are not transferred from one area of the state to another, and was only

intended for adult animals. Though we started to broach special considerations such as juvenile releases or releases of artificially created clans, family groups and packs, we never corrected the omission. Many rehabilitators have raised the concern about this, and I discussed this situation with rehabilitators and wildlife authorities in other states where spread of wildlife diseases such as rabies, CWD and EHD are present and of concern. I brought up their recommendations at the recent NRC hearing on Monday, Nov.29, and Sandra Jensen requested that I forward the language to you for consideration.

RELEASE OF JUVENILE ANIMALS:

- a) In cases where it is necessary to combine unrelated juvenile animals into clans, family units or packs to promote normal socialization and to prevent habituation to humans;
- b) The group may be released together, when appropriate, into an area that provides life-sustaining needs for the animals, including: natural food, fresh water, cover and range.
- c) The animals may not be released into any area where that species does not naturally occur and where there is an immediate threat to the animals, humans, or domestic animals.
- d) In instances where an epizootic disease has been detected in a county, babies of the affected species received from the affected county must be quarantined, and if healthy, may be combined with babies from negative counties to form a family group. However,
- e) Once ready for release, ALL of the animals in the group must be released into suitable habitat within the positive area.
- f) Indiana Fish and Wildlife will be responsible for notifying rehabilitators of wildlife disease status in the state should it occur, and provide locations of "hot" counties. The agency will make appropriate recommendations and restrictions, if required.

Thank you for your consideration of this matter.

Time stamp 28/02/2010 2:28:09 PM

Commentor Name Patti Reynolds

Commentor County 7

Commentor State IN

Commentor City Nashville

Commentor Organization Return to the Wild, Inc.

Commentor Email Email Commentor

Comment I agree with most of the regulation proposals as written. One topic that I feel needs to be further addressed is animal release. I agree with the comments and concerns of mammal rehabilitators regarding release in section 312 IAC 9-10-9 section 9 point (n). It should be allowable to release JUVENILE animals in areas/counties other than where they were found. For mammals a lot of this is based on the need to form family groups, or packs for survival both in captivity and in the wild post-release. This is how mammals - for example, deer, foxes, coyotes and raccoons normally function - in groups. Animals separated from the group with which they are raised have little or no chance of survival. With birds, it is important to be able to release JUVENILES in areas not near their parents, as they will be driven off the territory and can suffer both injury and starvation. All juveniles - both raised in captivity, or rescued late in their first year, need to be released in appropriate habitat for their survival - proper environment, shelter, water, and adequate prey base or food source. This MAY be near the site of rescue where birds are concerned, but most probably in all cases will need to be in an area away from origin; with mammals, this need is almost certainly true because of the need to maintain integrity of the family group established in captivity. In all cases, the verbiage regarding release NEAR LOCATION OF RESCUE (INCLUDING SAME COUNTY) should apply to ADULT mammals, reptiles and birds, in order to return them to familiar feeding and shelter territories, to lifetime mates, or even to families they are raising.

thank you -

Patti Reynolds, President

Return to the Wild, Inc

PO Box 1153, Nashville IN 47448

812-988-8990

eagleowl4180@sbcglobal.net

www.returntothewild.org

Time stamp 16/05/2010 10:16:51 PM

“Exhibit C”

DNR RESPONSE

Wild animal rehabilitation permits allow qualified individuals to take in wild animals (including mammals, birds, reptiles, and amphibians) for the purpose of caring for the animals until they can be released back into the wild. Many of the animals are orphaned young, but other animals may be sick or injured adults. While wild animal rehabilitators have good intentions, the DNR has had to take legal action on multiple permit holders within the past few years. Violations have included off-site rehabilitation of wild animals by assistants, the failure to release animals, not releasing animals within the timeframe required, filthy and unsanitary rehabilitation facilities that have even warranted action by county health departments, and attempts to transfer these animals to a game breeder license (which allows the sale of these animals). These issues, as well as others, necessitated the forming of a Wild Animal Rehabilitation Advisory Group to discuss modifying the existing rehabilitation permit rule. The Wild Animal Rehabilitation Advisory Group that met in 2009 and helped to formulate these proposed changes consisted of the following members: Kathy Hershey (licensed rehabilitator), Kim Hoover (licensed rehabilitator), Ron Johnson (DNR Conservation Officer), Tim Julien (Nuisance Wildlife Control Operator's Association), Dr. Larry McAfee DVM (licensed veterinarian and licensed rehabilitator), Sandra Norman DVM (Indiana Board of Animal Health), Patti Reynolds (licensed rehabilitator), Dean Zimmerman (DNR wildlife biologist), and Linnea Petercheff (DNR, Division of Fish and Wildlife Operations Staff Specialist). The DNR also took input from other rehabilitators who attended the meetings, but were not part of the advisory group.

Requirement for Testing and Continuing Education

Comments have been submitted both in support and in opposition to the proposed requirement of a test and continuing education for wildlife rehabilitators. The wild animal rehabilitation advisory group supported the requirement of a test for new applicants.

The DNR believes that this new testing requirement will help ensure that an applicant is familiar with the rule governing rehabilitation, has a basic understanding of the wild animals he/she will handle, is knowledgeable about the diseases that wild animals carry, and understands the purpose of rehabilitation (to release the animals back into the wild and not make them pets). Sixteen other states currently require a test for wildlife rehabilitators, including Kansas, Wisconsin, and Florida.

The continuing education requirement is proposed to require at least eight (8) hours of continuing education approved by the department in a three (3) year period of time, or the rehabilitator would need to take the test. The DNR plans to hold at least one (1) free meeting/training opportunity each year, rotating around the north, the south, and the central part of the state. The DNR has not traditionally held training for wildlife rehabilitators. A new organization was formed this year, the Indiana Wildlife Rehabilitator's Education Network, to help educate rehabilitators and those wanting to become wildlife rehabilitators. They offer multiple training opportunities each year, and some opportunities are free of charge. Board members within this organization are willing to help provide training in various locations around the state free of charge. One of the reasons for requiring continuing education is because of emerging diseases, such as white-nosed syndrome in bats, that wildlife rehabilitators need to know about. New information on medical protocols, techniques, and dietary requirements can also be obtained through continuing education. Without proper training and education, a wildlife rehabilitator

could inadvertently cause unnecessary suffering for a wild animal taken in for treatment, and release an animal that is diseased or habituated to humans. Wildlife rehabilitators need to know the proper formulas for feeding un-weaned wild animals and understand the proper way to handle and feed the animals to ensure that the animal does not become habituated to humans (this is particularly important with deer). This requirement will help ensure quality care for the animals and the best chance for the animals to survive in the wild once released.

One rehabilitator commented on the fact that the proposed rule language does not include a reference to study materials provided by the department. The NRC's hearings officer reviewed this proposed language and determined that it was not appropriate to place in the rule because it is an internal procedure and should not be required by law. The DNR willingly offers nuisance wild animal control operators a study packet free of charge to prepare for their testing requirement, which is available in hard copy and in electronic format, and plans to do the same for wildlife rehabilitators. There is simply no need to put this in rule language.

The DNR already requires those who do nuisance wild animal control work for the public to have to take a test and have 32 hours of continuing education every 4 hours, or re-take the test.

The DNR does not believe that a rehabilitator who has been handling wild animals for over 10 years should have to take the test initially. Most of these rehabilitators who have done this work for 10 years or more have obtained the education needed and learned the proper skills for rehabilitating wild animals, although they will be allowed to take the test if they choose to do so. Requiring this test for all applicants would also create an additional administrative burden on the DNR.

Requirement to release raccoons, skunks, opossums, foxes, coyotes, and deer in the county where the animals were obtained

Releasing these animals in any area where these animals already exist will increase competition for resources with animals already present, increase predation in the area on other native wildlife (such as ground-nesting birds and turtles), and create nuisance problems for humans nearby. A study on relocated raccoons in Illinois indicated that the translocated raccoons rarely stayed at the release site.

The statutory authority for the DNR Division of Fish and Wildlife in IC 14-22-2-3 is to "(1) Provide for the protection, reproduction, care, management, survival, and regulation of wild animal populations regardless of whether the wild animals are present on public or private property in Indiana; and (2) Organize and pursue a program of research and management of wild animals that will serve the best interests of the resources and the people of Indiana." The DNR is also required to develop rules that are based upon "data relative to (A) The welfare of the wild animal, (B) The relationship of the wild animal to other animals, and (C) The welfare of the people" in IC 14-22-2-6. The DNR does not have evidence to indicate that the rehabilitation of raccoons, opossums, skunks, foxes, coyotes, and deer provides for the welfare of that wild animal to other wild and domestic animals or the welfare of the people.

A few comments mentioned the deer that tested positive for tuberculosis in Indiana in 2009, and that these deer were on captive cervid farms, not from deer taken in by rehabilitators. While that is true, chronic wasting disease has been found in wild deer in Illinois and Wisconsin, and bovine tuberculosis has been found in wild deer in Michigan in the recent past. Therefore, the DNR believes that it is being pro-active to protect Indiana's wild deer population by limiting the locations where wild deer can be released.

The Wild Animal Rehabilitation Advisory Group and DNR believe that restrictions need to be in place for all species in regard to where they can be released to help prevent the spread of disease and parasites and provide a greater chance of survival. Adult birds need to be returned to the area where obtained, if possible, to reunite with a mate. Turtles have a homing instinct and will attempt to return to their original capture site if not released there. Snakes also need to be released as close as possible to the release site since they typically use the same site to hibernate each winter. Amphibians are rather sedentary because movement is so dangerous for them, and they must be released in habitat that provides for their entire life cycle, or they will have to move to other habitat. Some salamanders have also been reported to have a homing instinct. The chytrid fungus has also been found in Indiana in some amphibians, making it even more important to release amphibians as near as possible to the site of capture in order to limit the spread of any disease. However, the greatest need for location restrictions for mammals concern the release of raccoons, foxes, coyotes, skunks, and opossums for the following reasons:

1. All of these species carry a variety of diseases that can be transmitted to humans and/or domestic animals. Raccoons, foxes, and coyotes can carry canine distemper, parvovirus, rabies, and leptospirosis. Virginia opossums can also carry *Sarcocystis neurona*, a protozoan parasite that causes equine protozoal myeloencephalitis (EPM), which can be fatal to horses. EPM is costly to treat, and not all horses recover from it. Opossums are believed to be the main carrier of EPM, and horse owners are advised to keep barns, pastures, and stable areas free of opossums to help lower the risk of EPM (Midwest Thoroughbred 2010). Striped Skunks also carry canine distemper, the ascarid roundworm, and leptospirosis. Since there are no vaccines proven or labeled to be effective for treating rabies, distemper or parvovirus in wild animals, there is no guarantee that the release of these species of animals will not transfer a disease or parasite to other wild populations since they may have been held in enclosures with or near other diseased animals from other counties.
2. All of these species are found throughout Indiana. Therefore, releasing these animals in areas where other animals of the same species already exist increases competition for food, water, and shelter for the animals already present, or will cause those animals to disperse and have to cross roads where their likelihood of survival is minimal.

Resident landowners and tenants who take a raccoon, skunk, opossum, or fox that is causing damage on their property can kill the animal or release it, but if released, it must be released in the same county (312 IAC

9-3-15). Nuisance wild animal control permit holders already must release raccoons and other wild animals in the same county of capture or euthanize them (312 IAC 9-10-11).

In an article on the rehabilitation of raccoons (White 1989), "The numbers of raccoons released in a given area should be tightly controlled so that their impact on the area is minimized."

However, in response to the comments on the release of mammals and birds only in the county where originally found or obtained, that could require an animal to be released by itself if no other animals of the same species were taken in from that same county that year, the DNR is proposing the following changes in the rule language (see highlighted language):

(n) As soon as a wild animal is capable of fending for itself, the animal shall **must** be released into the wild as directed by a conservation officer. ~~If a wild animal is not capable of fending for itself, a conservation officer must be contacted for instructions concerning its disposition.~~ follows:

(1) The wild animal must be released on land only with permission of the landowner.

(2) Mammals must be tagged or marked as directed by the department if given a pharmaceutical product or other chemical for the purpose of tranquilizing or anesthetizing the mammal unless the product administered is labeled as safe for human consumption and the mammal is released after the clearance period.

(3) A bird must be released in the county from which it was originally found except as follows:

(A) A bird that is being released outside the breeding season for that species;

(B) A bird that has been in a rehabilitation facility for ninety (90) calendar days or more;

(C) A bird that is not in the order Anseriformes, Charadriiformes, Columbiformes, Falconiformes, Galliformes, Gruiformes, or Strigiformes; or

(D) A bird that is a juvenile;

may be released in appropriate habitat in any county that is within that species' normal range in

Indiana.

(4) A reptile or amphibian must be released at the site where found, unless the origin is unknown. If the origin is unknown, the reptile or amphibian may be released in appropriate habitat in the permit holder's county of residence.

(5) For mammals, the following applies:

(A) A mammal must be released in the county from which it was originally found or obtained, unless the origin is unknown **or the mammal is a juvenile as follows:**

(i) If the origin is unknown, the mammal may be released in appropriate habitat in the permit holder's county of residence.

(ii) If the mammal is a juvenile and was housed together with other animals of the same species, the mammal may be released with other juveniles in appropriate habitat in a county where at least one of the juveniles that were housed together was obtained.

(B) In addition to the requirements in subsections (n)(1), (n)(2) and (n)(5)(A), raccoons, Virginia opossums, striped skunks, coyotes, and foxes must be released only as follows or be euthanized:

(i) the release site must consist of at least two (2) contiguous acres,

(ii) no more than eight (8) animals per species may be released per two (2) acres of any site per calendar year, and

(iii) no more than:

(a) twenty-four (24) animals per species raccoons, Virginia opossums, striped skunks, and foxes; and

(b) two (2) coyotes;

may be released by a permit holder in a calendar year.

(C) In addition to the requirements in (n)(1), (n)(2) and (n)(5)(A), white-tailed deer must be released only as follows or be euthanized:

- (i) the release site must consist of at least five (5) contiguous acres,
- (ii) the release site must be outside city limits, and
- (iii) no more than ten (10) white-tailed deer may be released per site per calendar year.

Justification for limiting the number of raccoons that can be released

1. Diseases and Parasites

Raccoons carry a number of infectious diseases and parasites, some of which can be transferred to humans and domestic animals. Canine distemper is probably the most common disease carried by raccoons and is prevalent in Indiana, possibly due to the high population of raccoons. It can be transmitted to other canines, including domestic dogs (that are not vaccinated) and foxes that come into contact with an infected animal's feces, urine or other bodily secretions, as well as through direct contact with an infected animal. In Missouri in 2009, tests of diseased raccoons showed that approximately 60% had canine distemper. Another study has shown that there is an increase in the prevalence of canine distemper when the raccoons were more closely related, probably due to the fact that direct contact between animals is greater within related animals (Dharmarajan et al. 2010). With a high population of raccoons and the fact that they will den together in trees and other enclosed spaces in cold weather, the potential for disease transmission is high. Some raccoons taken in by rehabilitators have also been found to have raccoon parvovirus. The DNR has received multiple reports from licensed rehabilitators of raccoons dying from this disease while in their possession. No diseased raccoons should be rehabilitated and released back into the wild. While many rehabilitators treat these animals with vaccinations for canine distemper, parvovirus, and rabies, none of these vaccines are labeled for use on wild animals and have not been proven to be effective. This treatment usually does not even save the animal once it has the disease. By keeping these diseased animals in captivity, the disease can be spread to other animals within the same facility. Many rehabilitators also house raccoons together that come from different areas, spreading the disease to other raccoons in their possession. New information has revealed that some rehabilitators in Indiana are using Tamiflu®, an antiviral drug labeled for influenza in humans, on raccoons with distemper. Public health professionals have recommended that these drugs NOT be used in wildlife, and the FDA prohibits the use of this drug for extralabel use in chickens, turkeys and ducks. Additionally, the American Veterinary Medical Association stated in 2008 that no drug is available that will kill the canine distemper virus in infected dogs. If the raccoons are not housed properly to prevent the spread of disease, releasing raccoons with parvovirus or distemper provides for the transmission of these diseases to wild populations and may be to areas where the disease is not currently found. Attached please find one report from a licensed rehabilitator that documents a parvovirus outbreak.

Raccoons can also carry the roundworm, *Baylisascaris procyonis*, which can be transferred to humans and domestic animals through the ingestion of infected eggs. This roundworm, if ingested through soil, water, or on objects that have been contaminated with raccoon feces, can be fatal to humans, especially small children that will put almost anything they find into their mouths (such as raccoon feces found in sandboxes). Other animals can also become infected (such as dogs) by eating a small animal that has been infected with this roundworm (Sorvillo et al. 2002). Raccoons are also known to frequent barn lofts and defecate on top of stored straw or hay bales. As these bales are tossed about, the potential for raccoon roundworm eggs to become airborne and inhaled is greatly increased. Research from a professor at Purdue University has documented this parasite in Indiana raccoons. Furthermore, ongoing research in several counties in northern Indiana has found that a large

proportion of raccoon scat carry this roundworm. Allegheny woodrats, an endangered species in Indiana, experience mortality as a result of infection by raccoon roundworm, in addition to other factors. Attached also please find information about this roundworm and its devastating effects.

Raccoons can also carry rabies, of which there are different strains. The Centers for Disease Control and Prevention (see attached articles) recommended in 2007 that "stronger and more uniform federal and state wildlife regulations are necessary to prevent indiscriminate international, interstate, and intrastate movement and release of wild carnivores by private citizens." Although the raccoon rabies strain is not yet in Indiana, it is in Ohio and has spread to the Cleveland area within recent years. Oral rabies vaccinations, which are costly, have been used in states such as Ohio to prevent the spread of this raccoon rabies strain. Comments were also made about the use of these oral vaccinations for raccoons in Indiana. However, since this strain of rabies is not yet known to exist in Indiana, the DNR and Board of Animal Health do not believe that this program, which would require a great deal of staff time and expense, is necessary yet in Indiana. Raccoons can also carry leptospirosis and other parasites.

"Movement of both rabid and non-rabid raccoons plays an important role in disease spread." (Rosatte et. al., 2010)

Research was done in 1993 and 1994 in Illinois regarding the movements of translocated raccoons. "Because most of the translocated raccoons did not stay at the release site and sometimes dispersed considerable distances, translocated animals could add to nuisance wildlife problems for rural human residents or increase the spread of disease during zoonotic outbreaks. Hence, because some translocated animals disperse long distances after release, the rate of spread of zoonotic disease could be accelerated considerably. Further research on the effects of translocated raccoons is warranted because of the potential consequences for other wildlife species." (Mosillo et. al. 1999)

Another study found that where the population of raccoons was manipulated to be higher, the prevalence of raccoon roundworm increased to 54%, significantly greater than prevalence in the same subpopulation before the raccoons had greater intraspecific contact (Gompper et. al. 2005).

While some rehabilitators treat the raccoons in their care with vaccines for canine distemper, parvovirus, and rabies, none of these vaccines have been proven or documented to be effective for the treatment of these diseases in raccoons or other wild animals and are not labeled for use on wild animals.

2. Predation on other species

The raccoon population in Indiana is thought to be very high, which can have a substantial impact on other species of wildlife, such as ground-nesting birds and turtles. Some ground-nesting birds, such as bobwhite quail, can be significantly impacted by predators such as raccoons and coyotes. When a predator approaches, wildlife (such as ground-nesting birds) tend to move away from their eggs to try to lure the predator away from them, but it often results in the destruction of the eggs. Some of these species already have limited habitat in Indiana.

Various studies on predation of game birds have been conducted in the United States, with differing results, depending on the habitat and availability of other prey species. However, in

one study, predation was the primary cause of mortality for bobwhites at all life stages (Rollins and Carroll 2001). Ground-nesting birds are especially vulnerable to predation, and the most common predators include skunks, raccoons, opossums, bobcats, foxes, and coyotes (Hernandez et al. 1997, Fies and Puckett 2000, Staller et al. 2005). Stanley D. Stewart, a wildlife biologist in Alabama, stated, "If habitat is good, predator management can carry quail population to higher densities."

Raccoons are also common predators of turtle nests. Most species of turtles in Indiana bury their eggs in a hole in the ground in moist soil or sand near water. While some young hatch in the year the eggs are laid, others over-winter in the nest, making them very vulnerable to predation. One study done in Michigan showed that predation accounted for 82% of turtle nest mortality (Congdon et al. 2009) and another study in Iowa reported that over 80% of natural nests were destroyed by predators (Nelson et al. 2009). The most common predators of turtle eggs are raccoons, skunks, foxes, and opossums. Egg-laying snakes also lay their eggs in sand or soil where they are also subject to predation. Six (6) species of turtles and three (3) species of egg-laying snakes are classified as endangered in Indiana with 3 additional species listed as special concern.

Additional evidence of a high raccoon population in Indiana includes the numbers of nuisance raccoons taken by nuisance wild animal control permit holders, number of raccoons sold to licensed fur buyers, numbers of calls to the wildlife conflicts hotline in previous years, the DNR raccoon roadkill survey index, and amount of distemper outbreaks among raccoons throughout Indiana.

3. Nuisance Animals

Raccoons are also considered to be a nuisance animal by many landowners in urban and suburban neighborhoods. Raccoons will enter attics, barns, sheds, and fireplaces to live and have their young. Raccoons are also common on farms where they destroy corn, kill chickens, and cause other damage.

They will destroy soffitts in an effort to gain access to attics. Licensed nuisance wild animal control operators dealt with 7,275 raccoons in 2008 (5,074 were killed/euthanized) and 4,484 raccoons (3,031 were killed/euthanized) in 2007. USDA-Wildlife Services staff, manning the Wildlife Conflicts Information Hotline, handled approximately 1,000 raccoon-related calls each year for the past few years. Licensed rehabilitators released 890 raccoons in 2008 and 852 in 2007. Licensed rehabilitators lost another 582 raccoons due to disease or were euthanized in 2008 and another 285 died or were euthanized in 2007.

N. Budd Veverka reported in the Indiana 2008 & 2009 Raccoon Road-kill Survey Report (2010), "The 2008 and 2009 statewide raccoon road-kill indices, though not the highest observed, continue a steady upward trend, likely representing an increasing raccoon population. Regionally, data indicates an increasing trend in the relative abundance of raccoons for all six regions across the state, with record highs in the Southwest and South Central regions in 2009. Due to the collapse of the fur market in the late 1980s and the cultural decline in trapping, the raccoon population in Indiana has experienced significant growth over the past two decades."

"Urban raccoons experienced the fewest mortality sources, whereas rural raccoons experienced the most. Disease was the greatest mortality factor at the urban site, while vehicle-related mortalities dominated at the suburban and rural sites. Our data suggest that multiple factors, including increased survival, higher annual recruitment, and increased site

fidelity, are jointly responsible for high-density raccoon populations in urbanized areas.” (Prange et al. 2003)

“In suburban areas, raccoons often raid gardens and garbage cans, and carrion is readily consumed. They will also feed on small vertebrates, such as young turtles or muskrats, when these are readily available, and dig up the eggs of turtles in large numbers on some nesting beaches.” (Whitaker and Hamilton 1998)

4. Legal Impacts

Some of Indiana’s state legislators have also expressed concerns about the numbers of raccoons and complaints they have received regarding raccoon damage, and the Indiana Farm Bureau has also sent a letter to the DNR regarding crop damage from raccoons.

5. Conclusion

The majority of raccoons taken in by rehabilitators are orphaned young. Raccoons can have 3-7 young each year, and typically live up to 5 years in the wild. Foxes, bobcats, coyotes, owls, and other predators kill some juvenile raccoons, but for adult raccoons, automobiles, diseases and accidents (such as from falling from trees) are more important causes of death than are predators (Whitaker and Hamilton 1998).

Justification for limiting the number of coyotes that can be released

The DNR is required to develop rules that are based upon “data relative to (A) The welfare of the wild animal, (B) The relationship of the wild animal to other animals, and (C) The welfare of the people” in IC 14-22-2-6.

The DNR does not have evidence to indicate that the rehabilitation of raccoons, opossums, skunks, foxes, coyotes, and deer provides for the welfare of that wild animal to other wild and domestic animals or the welfare of the people. In fact, new research on coyote attacks on humans indicates that the habituation of coyotes to humans (through rehabilitation or illegal possession) can cause the coyote to become less afraid of humans and become a nuisance or threat in the future (White and Gehrt, 2009). The rehabilitation of coyotes does not provide for the welfare of the people of Indiana whose pet dog or livestock are at risk or the welfare of other animals that they displace or attack (such as small domestic dogs and goats). The DNR is proposing to lower the number of coyotes that can be taken in for rehabilitation and released in response to public comments and the concerns for the welfare of the people of Indiana and other animals, both wild and domestic. The number of coyotes taken in by licensed wildlife rehabilitators the past few years has been less than six (6) per year for the entire state of Indiana, so reducing the number to two per year should have minimal impact on wildlife rehabilitators and would allow a rehabilitator to release two (2) together in a single location. Coyotes also do not typically den in urban environments and are likely to move their young to another den if disturbed.

Coyotes carry a number of infectious diseases and parasites, some of which can be transferred to humans and domestic animals. Canine distemper is probably the most common disease carried by coyotes in Indiana. Distemper is especially noticeable when populations are high. Canine distemper can be transmitted to other canines, including domestic dogs and foxes. Coyotes can also carry rabies, of which there are different strains. Coyotes can also carry brucellosis, the tapeworm *Echinococcus multilocularis* (a tapeworm which also has public health implications), mange, and canine heartworm. While some rehabilitators may treat coyotes and other wild animals in their care with vaccines for canine distemper, parvovirus enteritis, and rabies, none of

these vaccines have been proven or documented to be effective for the treatment of these diseases in wild animals, especially long-term, and are not labeled for use on wild animals.

Coyotes impact other native species in Indiana. The coyote population in Indiana is doing well and reports of coyotes in urban and suburban areas appear to be increasing. They can displace other species, such as red foxes, and eat food needed by other species. They will also kill poultry and eat their eggs. Coyotes have also been known to kill dogs, cats, and livestock. Some ground-nesting birds, such as bobwhite quail, can be significantly impacted by predators such as raccoons and coyotes. When a predator approaches, wildlife tend to move away from their eggs to try to lure the predator away from the nest, but it often results in the destruction of their eggs.

Coyotes are also considered to be a nuisance animal by many landowners in urban and suburban neighborhoods and many people are afraid for their children and pets. Years ago, the Indiana General Assembly passed a law (IC 14-22-6-12) to allow landowners, and anyone authorized in writing by a landowner, to take coyotes on their land at any time to help deal with nuisance coyotes.

Justification for limiting the number of opossums, skunks, and foxes that can be released

1. Disease and parasites

Virginia opossums, foxes, and striped skunks also carry a number of infectious diseases and parasites, some of which can be transferred to humans and domestic animals. Coyotes and red foxes can carry canine distemper, the tapeworm *Echinococcus multilocularis* (a tapeworm which also has public health implications), and canine heartworm; distemper is especially noticeable when populations are high. Canine distemper can be transmitted to other canines, including domestic dogs. Striped skunks, foxes, opossums, and coyotes can also carry rabies, of which there are different strains. Virginia opossums can also carry *Sarcocystis neurona*, a protozoan parasite that causes equine protozoal myeloencephalitis (EPM), which can be fatal to horses. EPM is costly to treat, and not all horses recover from it. Rehabilitators often treat canines in their care with vaccines for canine distemper, parvovirus enteritis, and rabies, none of these vaccines have been proven or documented to be effective for the treatment of these diseases in wild animals and are not labeled for use on wild animals. All gray foxes given the modified live-virus canine distemper vaccination died within seventeen (17) days post-vaccination in one study (Henke 1997).

2. Predation on other native species

Virginia opossums, foxes, striped skunks, and coyotes impact other native species in Indiana. Virginia opossums, foxes, striped skunks, and coyotes will also kill poultry and eat their eggs.

Some ground-nesting birds, such as bobwhite quail, can be significantly impacted by predators such as raccoons, foxes, skunks, and coyotes. Various studies on predation of game birds have been conducted in the United States, with differing results, depending on the habitat and availability of other prey species. However, in one study, predation was the primary cause of mortality for bobwhites at all life stages (Rollins and Carroll 2001). Ground-nesting birds are especially vulnerable to predation, and the most common predators include skunks, raccoons, opossums, bobcats, foxes, and coyotes (Hernandez et al. 1997, Fies and Puckett 2000, Staller et al. 2005). Stanley D. Stewart, a wildlife biologist in Alabama, stated, "If habitat is good, predator management can carry quail population to higher densities." When a predator approaches, wildlife tend to move away from their eggs to try to lure the predator away from the nest, but it often results in the destruction of their eggs.

The most common predators of turtle eggs are raccoons, skunks, foxes, and opossums. Most species of turtles in Indiana bury their eggs in a hole in the ground in moist soil or sand near water. While some young hatch in the year the eggs are laid, others over-winter in the nest, making them very vulnerable to predation. One study done in Michigan showed that predation accounted for 82% of turtle nest mortality (Congdon et al. 2009) and another study in Iowa reported that over 80% of natural nests were destroyed by predators (Nelson et al. 2009). Egg-laying snakes also lay their eggs in sand or soil where they are also subject to predation. Six (6) species of turtles and three (3) species of egg-laying snakes are classified as endangered in Indiana with 3 additional species listed as special concern.

3. Nuisance Animals

Coyotes, red foxes, opossums, and striped skunks are also considered to be a nuisance animal by many landowners in urban and suburban neighborhoods.

Limiting the numbers of coyotes and other species released by wildlife rehabilitators shows that the DNR is being responsive to the public comments and is taking action to provide for the welfare of wild animal populations, including that of raccoons, coyotes and other species (turtles, ground-nesting birds, etc.). This proposed rule change is not likely to result in a significant impact to any of the populations of these species in Indiana. This step helps provide for the protection, reproduction, management, and survival of many other species of wild animals that the DNR has the responsibility of protecting, without impacting the populations of coyotes, foxes, raccoons, opossums, and skunks to such a level that they become rare.

Requiring that wild animals taken in for rehabilitation be released within 180 days

The new language governing the requirement to release a wild animal taken in for rehabilitation within 180 days is currently in a non-rule policy that was approved by the Natural Resources Commission in May of 2006. Currently, wild animals must be released or euthanized within 180 days of taking possession of the animal, unless an exemption is granted by the DNR (conservation officer or Operations Staff Specialist). The time of year is not an approvable reason for an extension, including white-tailed deer. Comments were received about extending the time to possess a white-tailed deer for the purpose of rehabilitation to 240 days instead of 180 days. This would allow a rehabilitator to possess a deer in captivity for up to 9 months, primarily to release the deer outside the deer hunting season. Keeping deer for up to 240 days could easily cause the deer to become more habituated to humans, causing the deer to become a nuisance to other landowners when released. Releasing these deer in the same location each year also does not provide for their survival by increasing competition for other wild deer in the area. Keeping deer in captivity just because of the hunting season is contrary to the purpose of wildlife rehabilitation, which should be to release the animal as soon as it is capable of fending for itself. Many wildlife rehabilitators in Indiana that rehabilitate white-tailed deer fawns every year do not believe that there is a need to possess a white-tailed deer for more than 180 days. In fact, most of them release their deer around Labor Day weekend, giving the deer plenty of opportunity for survival prior to the start of the archery season. Possessing a deer longer in captivity only increases the chances that the deer will become habituated to humans and learn to obtain food from humans, in addition to adding to the disease concerns by keeping multiple wild deer in a small enclosure where they will eat from the same location, increasing the likelihood of the spread of a disease between those deer.

Migratory birds must be released within 180 days according to federal law (50 CFR 21.31), unless additional time is authorized by the U.S. Fish and Wildlife Service Migratory Bird Permit Office.

Ten states require wild animals taken in for rehabilitation to be released as soon as possible, and an additional 21 states have an upper limit such as 90 or 180 days. Keeping animals longer than this number of days only provides more opportunities for the wild animals to be become habituated to humans, pick up more diseases or parasites, and become treated like pets. Wild animals were not designed for life in a cage and should not be held captive longer than necessary.

Record-keeping Requirement

In response to the comment regarding the records of all pharmaceutical products and chemicals for a wild animal taken in for rehabilitation, the DNR requests that the language be amended to eliminate birds from this requirement since they are not a human food source and this information will not serve a necessary purpose.

~~(h)~~ **(I)** A permit holder must maintain current records for each wild animal to include the following:

- (1) The species and condition of the animal.
- (2) The name, address, and telephone number of the donor or other source of the animal.
- (3) The date of receipt by the permit holder.
- (4) The treatment, **including the identification of and date of administration of any pharmaceutical product or other chemical given** provided to the animal **a mammal or reptile** while in captivity.
- (5) The method and date of disposition of the wild animal.

All records must be maintained at the facility of the permit holder for a minimum of three (3) years.

Requirement for diseased animals other than migratory birds to be euthanized

Since there are no vaccinations labeled for use on wild animals, licensed veterinarians administer vaccinations to wild animals that are the most closely related. One of the most prevalent diseases in Indiana wildlife is canine distemper, commonly found in raccoons. Canine distemper can be transmitted to foxes, coyotes, and domestic dogs. Treatments for canine distemper or parvovirus rarely save the animal once it shows symptoms of the disease. While it may appear that these wild animals that are vaccinated are free from disease, the DNR does not have any research or other evidence to prove that these animals remain free from this disease for years to come, or that they do not serve as a carrier that can transmit the disease to another wild animal. If the animal is already diseased, the DNR believes that the animal should be humanely euthanized instead of being given prolonged and expensive treatments that may or may not save the animal. Most species of wild animals taken in for rehabilitation are common in Indiana, and the requirement to euthanize a diseased wild animal such as a skunk or raccoon would not be likely to impact the population in Indiana.

Requirement to prohibit the spaying and neutering of wild animals taken in for rehabilitation

Wild animals that are currently taken in for rehabilitation are not allowed to be spayed or neutered pursuant to 312 IAC 9-2-13. Adding the proposed language into the wild animal

rehabilitation permit rule in subsection (v) provides clarification for rehabilitators. There are many concerns regarding the spaying or neutering of raccoons and other wild animals before release back into the wild. First of all, raccoons and carnivores, in particular, have a social hierarchy that helps them compete in the wild for food, water, and shelter. Many other species have well established territories. When a raccoon or canine is spayed or neutered, its social hierarchy is affected and it cannot compete as well with other wild raccoons and canines that have not been surgically altered.

While spaying or neutering a wild animal may reduce the reproductive potential of the species that is released on one property, these wild animals must also find shelter and compete with other wild animals already living in the wild on that property. Therefore, it is very likely that some of these animals that would be surgically altered will still have to move to another location to find adequate food and shelter. They could also cause problems for neighbors when they disperse. Each property has a carrying capacity for the number of animals due to limits on food, water, and shelter and interactions with other wild animals. Wild animals that are not spayed or neutered will have a better chance to compete with other wild animals of the same species, as well as other species, and survive in the wild. of the animals or birth control measures that could have indirect effects.

Literature Cited

American Veterinary Medical Association. 2008. What you should know about canine distemper.

Blandford, Matt. 2008. Parvovirus outbreak in raccoons (*Procyon lotor*) being rehabilitated at Wildcat Wildlife Center. Wildlife Rehabilitation Bulletin 26 (1): 41-43.

Blanton, et. al. 2009. Rabies surveillance in the United States during 2008. Journal of American Veterinary Medical Association, 235 (6):676-689.

Brodin, Amanda, Amanda Gilbert, Brock Nelson, and Pierce Sweeney. 2009. Distribution of and predation on ornate box turtle nests at hawkeye wildlife area. Cornell Symposium.

Centers for Disease Control and Prevention. 2004. *Baylisascaris* infection, raccoon roundworm infection, a fact sheet for the general public.

Congdon, Justin, Donald Tinkle, Gary Breitenbach, Richard Van Loben Sels. 1983. Nesting Ecology and Hatching success in the turtle *Emydoidea Blandingi*. Herpetologica, 39(4):417-429.

Dharmarajan, Guha, et al. 2010. Demographics and landscape factors affecting transmission dynamics of disease in raccoons (*Procyon lotor*) inhabiting a fragmented landscape. Indiana Chapter of the Wildlife Society Symposium.

Fies, M.L., and K.M. Puckett. 2000. Depredation patterns of northern bobwhite nest predators in Virginia. Proceedings of Fourth National Quail Symposium, 4: 96-102.

Gompper, Matthew and Amber N. Wright. 2005. Altered prevalence of raccoon roundworm *Baylisascaris procyonis* owing to manipulated contact rates of hosts. Journal of Zoology. London. 266:215-219.

Hanlon, C. et al. 1999, Recommendations of a national working group on prevention and control

of rabies in the United States. Article III: Rabies in wildlife. Journal of American Veterinary Medical Association, 215 (11):1612-1618.

Henke, Scott E. Ph.D., Effects of Modified Live-Virus Canine Distemper Vaccines in Gray Foxes. Caesar Kleberg Wildlife Research Institute. Journal of Wildlife Rehabilitation, 20(2):3-7.

Hernandez, F., D. Rollins, and R. Cantu. 1997. Evaluating evidence to identify ground-nesting predators in west Texas. Wildlife Society Bulletin, 25: 826-31.

Mosillo, Maia, Edward Heske, and John D Thompson. 1999. Survival and Movements of Translocated Raccoons in Northcentral Illinois. Journal of Wildlife Management, 63 (1): 278-286.

Prange, Suzanne, Stanley Gehrt, and Ernie Wiggers. 2003. Demographic Factors Contributing to High Raccoon Densities in Urban Landscapes. Journal of Wildlife Management 67(2): 324-333.

Rosatte, R. et al. 2010. Density, movements, and survival of raccoons, in Ontario, Canada: implications for disease spread and management., Journal of Mammalogy, 91(1):122-135.

Solvillo, F. et al. 2002. *Baylisascaris procyonis*: an emerging helminthic zoonosis. Emerging Infectious Diseases, 8(4): 355-359.

Staller, E.L., et al. 2005. Identifying predators at northern bobwhite nests. Journal of Wildlife Management, 69:124-32.

Veverka, N. Budd. 2010. 2008 & 2009 Raccoon road-kill surveys. Indiana Department of Natural Resources, Division of Fish and Wildlife. Wildlife Management and Research Notes.

Whitaker, Jr., John O. and William J. Hamilton, Jr. 1998. Mammals of the Eastern United States. Cornell University.

White, Lynsey A. and Stanley D. Gehrt. 2009. Coyote Attacks on Humans in the United States and Canada. Human Dimensions on Wildlife, 14:419-432.

“Exhibit D”

TITLE 312 NATURAL RESOURCES COMMISSION

Final Rule

LSA Document #10-418(F)

DIGEST

Amends 312 IAC 9-10-9 governing the wild animal rehabilitation permit. Effective 30 days after filing with the Publisher.

312 IAC 9-10-9

SECTION 1. 312 IAC 9-10-9 IS AMENDED TO READ AS FOLLOWS:

312 IAC 9-10-9 Wild animal rehabilitation permit

Authority: IC 14-10-2-4; IC 14-22-2-6

Affected: IC 4-21.5; IC 14-22

Sec. 9. (a) This section governs a permit to possess a wild animal for rehabilitation. The permit is:

(1) required for to temporarily possess any wild animal that is:

(A) a mammal;

(B) a bird;

(C) a reptile; or

(D) an amphibian;

for rehabilitation purposes; and is

(2) available only to an individual who is a resident of Indiana.

~~A white-tailed deer must not be possessed under this section for more than one hundred eighty (180) days unless a conservation officer inspects the animal and determines an extended period may be reasonably expected to result in its rehabilitation.~~

(b) An individual may, without a permit, take possession of a sick, injured, or orphaned wild animal and transport it to an individual with a valid permit under this section within twenty-four (24) hours.

~~(b) (c)~~ **(c)** An application for a permit under this section shall be completed on a departmental form and must establish **provide** the following:

~~(1) The applicant has rehabilitation experience and a knowledge of wildlife rehabilitation techniques. The required one (1) year of experience and knowledge may be met by with one (1) of the following types of facilities that works with the species to be rehabilitated:~~

~~(A) A bachelor of science degree in a wildlife related field.~~

~~(B) At least one (1) year of experience with a:~~

~~(i) (A) A licensed veterinarian who has a wild animal rehabilitation permit.~~

~~(ii) zoo; (B) A zoological park.~~

~~(iii) (C) A university animal clinic.~~

~~(iv) county animal shelter; or~~

~~(v) (D) A licensed rehabilitation clinic.~~ **wild animal rehabilitator who has had a permit for at least three (3) years.**

~~(C) Possession for at least two (2) years of another permit under this section.~~

~~(D) Other knowledge and background, including the completion of rehabilitation workshops and seminars, if found by the division director to qualify the applicant.~~

Documentation of the experience with a licensed veterinarian, university animal clinic, zoological park, or licensed wild animal rehabilitator must be submitted with the application.

(2) The name and address of a veterinarian willing to assist the applicant with the rehabilitation of wild animals. The veterinarian shall sign the application and attest to having experience in the care and rehabilitation of **the species of wild mammals and birds: animals to be rehabilitated.** If the applicant is a veterinarian, the signature of another veterinarian is not required.

(3) A listing of the wildlife rehabilitation reference books in possession of the applicant. **The individual must have at least one (1) reference book that:**

(A) includes information pertaining to each species listed on the application form; and

(B) is on the list approved by the department.

(4) The names, addresses, and telephone numbers of any other individuals who will assist the applicant. ~~Assistants must possess sufficient experience and adequate facilities to tend the species in their care and be authorized in writing by the permit holder to provide care for that species of animal in their own facility.~~

(5) The species **or type of animals** that will be accepted for rehabilitation.

(6) A description of the rehabilitation facilities, equipment, and supplies. The description shall include the following:

(A) Cages.

(B) Intensive care units.

(C) Aviaries.

(D) Falconry equipment.

~~(E) Medical diagnostic equipment.~~

~~(F) Medical supplies.~~

~~(G) Food sources.~~

~~(H) (E) Other items to be utilized in the rehabilitation process.~~

A cage description shall provide its internal dimensions and shall specify the materials used for flooring, walls, and perches. ~~The applicant shall list what species will be housed in the various enclosures and the purpose for each enclosure, for example, convalescing, training, or quarantine.~~

(7) **The applicant is at least eighteen (18) years of age.**

(d) Before a permit may be issued, the applicant must correctly answer at least eighty percent (80%) of the questions on a written examination supervised and

administered by the department covering basic biology, care of wild animals, and the laws relating to wild animal rehabilitation.

(1) An individual who fails to correctly answer at least eighty percent (80%) of the questions on the examination may retake the examination not more than two (2) additional times within ninety (90) days, but not again within one hundred eighty (180) days after the third failure.

(2) Exempted from this subsection is an individual who has had a permit under this section for ten (10) years and taken in at least twelve (12) wild animals each year for rehabilitation. However, all individuals who have a permit under this subsection must meet the requirements in subsection (e).

(e) A permit holder who has satisfied subsection (d) must, within three (3) years of being issued a permit, either:

(1) satisfy the same requirements as are set forth in subsection (d) on another examination; or

(2) complete eight (8) hours of continuing education as approved by the division, including courses that will be sponsored by the department, National Wildlife Rehabilitator's Association, or International Wildlife Rehabilitation Council.

(f) A conservation officer must inspect the cages and any other enclosures where wild animals will be housed before a permit may be issued to a new applicant. A conservation officer may inspect the enclosures, wild animals, and any records relative to a permit issued under this section at any reasonable hour.

~~(e)~~ (g) An amended application or written request must be filed with the division if there is a material change to the information address of the applicant, the name of the assisting veterinarian, the identity of assistants or the addition of species of wild animals that was provided in the original application. ~~The amended application must include the name, address, and telephone number of any additional person who would assist the permit holder.~~

~~(d)~~ (h) The permit holder must file an application by January 15 31 of each year in order to renew the permit. The annual report required under subsection (i) (m) must accompany the renewal application. The signature of a veterinarian is not required for a renewal application.

~~(e)~~ (i) The issuance of a permit under this section does not relieve an individual from any requirement for a federal permit. If the terms of a federal permit and the permit issued under this section differ, the more restrictive terms prevail.

~~(f)~~ A (j) Public exhibition or display of any wild animal possessed pursuant to a permit issued under this section must not be displayed or placed in physical contact with the public, except according to the terms of an educational permit issued under section 9.5 of this rule. is prohibited. Only assistants and other individuals dropping off an animal for rehabilitation at the permit holder's facility may view or have contact

with the wild animal unless specifically authorized in writing by the department. Electronic viewing and photographs are allowed.

~~(g)~~ (k) A permit holder must maintain facilities for the retention of a wild animal possessed under this section in a sanitary condition as follows and to conform with any other conditions specified by the permit:

- (1) Cages must be cleaned daily using nonirritating methods unless medical treatment necessitates otherwise.
- (2) The permit holder and any assistants listed on the permit must observe and provide care for wild animals at least once daily unless otherwise specified by the permit.
- (3) Wild animals must be kept in enclosures and in an environment that minimizes human contact at all times to prevent imprinting and bonding to humans. The permit holder or designated assistants should interact with the wild animal only to the extent necessary to provide adequate care and treatment.
- (4) Wild animals must not be allowed to come into contact with any individuals other than:
 - (A) a permit holder;
 - (B) an assistant listed on a rehabilitation permit;
 - (C) a licensed veterinarian;
 - (D) an animal control officer;
 - (E) a law enforcement officer; or
 - (F) an authorized department employee.
- (5) Wild animals must not be housed in a cage that would allow physical contact of the animals undergoing rehabilitation with domestic or companion animals or animals kept under any other license or permit unless authorized in writing by the department.
- (6) If suspected of having an infectious disease, wild animals must be quarantined in areas designated for that purpose.
- (7) Wild animals must be kept separated from human living quarters and activities unless intensive care is required, but unweaned wild animals may be housed in human living quarters that are away from human activities.
- (8) Wild animals must be housed in enclosures that:
 - (A) are structurally sound;
 - (B) are of sufficient strength for the species involved;
 - (C) are maintained in good repair to prevent escape or injury to wild animals being rehabilitated;
 - (D) are constructed to allow sufficient space for individual posture and social movements, unless medical treatment necessitates restricted mobility;
 - (E) are secured when unattended;
 - (F) have protective devices at entrances and exits to prevent escapes if kept outdoors and if needed to prevent injuries to human or the animal's health;
 - (G) have ambient temperatures that are appropriate for the species located within the enclosure;
 - (H) have adequate ventilation by means of:
 - (i) windows;

- (ii) doors;
- (iii) vents;
- (iv) fans; or
- (v) air conditioning;
- to protect wild animal health and to minimize drafts, odors, and condensation;
- (I) maintain adequate lighting by artificial or natural means that is cycled for appropriate photoperiod, if necessary for the species in possession;
- (J) provide adequate shade, weatherproof shelters, nest boxes, perches, and dens to protect wild animals from inclement weather and direct sun if kept outdoors.
- (9) No exposed sharp objects, ponds with steeply sloped banks, toxic paints or sealants, or poisonous vegetation may be used in the construction of enclosures.
- (10) Enclosures shall have either visual barriers or be separated by distance to restrict a wild animal's view of humans and other species being rehabilitated to reduce inappropriate imprinting, socialization, habituation, or stress, unless a view of humans and other wild animals will not affect the animal's ability to survive in the wild.
- (11) Wild animals must be fed as follows:
 - (A) Appropriately and adequately to meet nutritional needs unless medical treatment necessitates restricted food intake.
 - (B) With food that is palatable, free of contamination, and of sufficient quantity and nutritive value for the species involved, including the use of supplemental vitamins and minerals when necessary for recovery.
 - (C) With food receptacles that are appropriately sized, easily accessible, and kept sanitary and safe.
- (12) Wild animals must be given water as follows:
 - (A) Fresh clean water for drinking shall be provided throughout the day unless medical treatment necessitates restricted water intake.
 - (B) Additional water shall be provided for species requiring bathing, swimming, or misting unless medical treatment necessitates restricted water exposure.
 - (C) With water receptacles that are appropriately sized, easily accessible, kept sanitary as much as possible, and safe.
- (13) Removal and disposal of wild animal food wastes, feces and urine, bedding, from the enclosure and premises shall be performed daily to maintain sanitary conditions and protect wild animal and human health. Trash, garbage, debris, and carcasses must be removed from the enclosure as soon as they are observed and appropriately disposed of.
- (14) Cages, rooms, hard surfaced pens, kennels, runs, equipment, and food and water receptacles shall be sanitized between each adult wild animal use and between litters to prevent disease transmission.

~~(H)~~ (I) A permit holder must maintain current records for each wild animal to include the following:

- (1) The species and condition of the animal.
- (2) The name, address, and telephone number of the donor or other source of the animal.
- (3) The date of receipt by the permit holder.

(4) The treatment provided to the animal while in captivity, **including the identification of and date of administration of any pharmaceutical product or other chemical to a mammal or reptile.**

(5) The method and date of disposition of the wild animal.

All records must be maintained at the facility of the permit holder for a minimum of three (3) years.

(i) **(m)** The permit holder shall provide **an a signed** annual report to the division by January 15 ~~31~~ of each year. The report shall list the following:

- (1) The species and condition of each animal.
- (2) The date the animal was received.
- (3) The name and ~~address~~ **county** of the donor or other source.
- (4) The method, location, and date of disposition of the animal.

The report may be a computerized record signed by the permit holder under oath or affirmation to be a true and accurate account of all wild animals taken in for rehabilitation during that year or on a form provided by the department and must be maintained at the facility of the permit holder for a minimum of three (3) years.

(i) **(n)** As soon as a wild animal is capable of fending for itself, the animal shall ~~must~~ be released into the wild as directed by a conservation officer. ~~If a wild animal is not capable of fending for itself, a conservation officer must be contacted for instructions concerning its disposition. follows:~~

- (1) The wild animal must be released on land only with permission of the landowner.
- (2) Mammals must be tagged or marked as directed by the department if given a pharmaceutical product or other chemical for the purpose of tranquilizing or anesthetizing the mammal unless the product administered is labeled as safe for human consumption and the mammal is released after the clearance period.
- (3) A bird must be released in the county from which it was originally found except:
 - (A) a bird that is being released outside the breeding season for that species;
 - (B) a bird that has been in a rehabilitation facility for ninety (90) calendar days or more;
 - (C) a bird that is not in the order Anseriformes, Charadriiformes, Columbiformes, Falconiformes, Galliformes, Gruiformes, or Strigiformes; or
 - (D) A bird that is a juvenile;
 may be released in an appropriate habitat in any county that is within that species' normal range in Indiana.
- (4) A reptile or amphibian must be released at the site where found, unless the origin is unknown. If the origin is unknown, the reptile or amphibian may be released in an appropriate habitat in the permit holder's county of residence.
- (5) For mammals, the following apply:
 - (A) A mammal must be released in the county from which it was originally found or obtained, unless the origin is unknown or the mammal is a juvenile.
 - (B) If the mammal's origin is unknown, the mammal may be released in an appropriate habitat in the permit holder's county of residence.

(C) If the mammal is a juvenile and was housed together with other animals of the same species, the group may be released in appropriate habitat in a county where at least one member of the group originated.

(D) In addition to the requirements in subdivisions (1) and (2) and clauses (A) – (C), raccoons, Virginia opossums, striped skunks, coyotes, and foxes must be released only as follows or be euthanized:

(i) The release site must consist of at least two (2) contiguous acres.

(ii) Not more than eight (8) animals per species may be released per two (2) acres of any site per calendar year.

(iii) Not more than:

(AA) twenty-four (24) each of raccoons, Virginia opossums, striped skunks, and foxes; and

(BB) two (2) coyotes;

may be released by a permit holder in a calendar year.

(E) In addition to the requirements in subdivisions (1) and (2) and clauses (A) – (C), white-tailed deer must be released only as follows or be euthanized:

(i) The release site must consist of at least five (5) contiguous acres.

(ii) The release site must be outside city limits.

(iii) Not more than ten (10) white-tailed deer may be released per site per calendar year.

(o) A permit holder may keep a nonreleasable wild animal, other than a white-tailed deer, only if approved by the division of fish and wildlife as follows:

(1) For educational purposes under a special purpose educational permit under section 9.5 of this rule as follows:

(A) For mammals other than white-tailed deer, as follows:

(i) A wild animal possession permit must be obtained under 312 IAC 9-11.

(ii) Not more than three (3) mammals per species and six (6) mammals total may be possessed if twelve (12) or fewer total mammal programs are presented to the public each calendar year.

(iii) Not more than five (5) mammals per species and not more than twenty (20) mammals total may be possessed if thirteen (13) or more total mammal programs are presented to the public each calendar year.

(iv) Exceptions to these numbers may be granted upon prior written approval from the division based on the number of educational programs presented to the public in the previous year.

(B) For birds, as follows:

(i) A special purpose educational permit must be obtained under section 9.5 of this rule.

(ii) Not more than three (3) birds per species may be possessed and six (6) birds total if twelve (12) or fewer programs with each bird are presented to the public each calendar year.

(iii) Not more than five (5) birds per species may be possessed and not more than twenty (20) birds total if thirteen (13) or more bird programs with each bird are presented to the public each calendar year.

(iv) Exceptions to these numbers may be granted upon prior written approval from the division based on the number of educational programs presented to the public in the previous year.

(C) For reptiles, as follows:

(i) A turtle possession permit must be obtained under 312 IAC 9-5-11 to possess an eastern box turtle, and a wild animal possession permit must be obtained under 312 IAC 9-11 to possess an endangered species of reptile.

(ii) Not more than three (3) reptiles per species and six (6) reptiles total may be possessed if twelve (12) or fewer total reptile programs are presented to the public each calendar year.

(iii) Not more than four (4) reptiles per species and not more than twenty (20) reptiles total may be possessed if thirteen (13) or more total reptile programs are presented to the public each calendar year.

(iv) Exceptions to these numbers may be granted upon prior written approval from the division based on the number of educational programs presented to the public in the previous year.

(2) For fostering other wild animals only if five (5) mammals or birds of the same species have been reported in at least the two (2) previous years.

(3) Wild animals that have been used in educational programs or as foster parents and are no longer capable of being used in that capacity due to age or health may be kept with written permission from the division of fish and wildlife.

(4) Wild animals possessed lawfully prior to July 1, 2010, are exempt from the requirements in this subsection.

(5) Nonreleasable wild animals may be transferred to another individual licensed under this subsection or an individual with a falconry license under section 13 of this rule that has had a permit for at least three (3) consecutive years and will use the animal for fostering or educational programs in accordance with this subsection.

(6) A determination that a wild animal is nonreleasable must be based upon a licensed veterinarian's examination and statement.

(7) As used in this subsection, "nonreleasable" means a wild animal that:

(A) cannot obtain food on its own in the wild;

(B) does not exhibit locomotive skills necessary for that species to survive;

(C) does not possess adequate vision to find or catch, or both, food and maneuver in a normal manner; or

(D) cannot otherwise fend for itself without medical care due to disease or extensive injuries.

(p) An individual who does not hold a permit under this section but is listed as an assistant on a permit issued under this section may assist a permit holder, but only if the permit holder supervises the individual as follows:

(1) An assistant must be at least sixteen (16) years of age to provide assistance at the permit holder's facility.

(2) An assistant under eighteen (18) years of age must be under the direct and on-site supervision of the permit holder.

(3) An assistant of eighteen (18) years of age or older may provide assistance at the permit holder's facility or as follows:

- (A) With written authorization, an assistant listed on the permit may possess a wild animal under this section at a location not authorized on the permit for not more than thirty (30) consecutive days unless authorized by the department.
- (B) The permit holder maintains responsibility for the care of the wild animal.
- (C) The permit holder provides supervision with written instructions and is available for phone contact with the assistant at all times.
- (D) The facilities of the assistant meet the same facility standards as the permit holder.
- (E) The wild animal possessed by an assistant is returned to the permit holder at the time of weaning or release, whichever comes first.

(q) A permit holder may possess a wild animal for rehabilitation under this section for one hundred eighty (180) days except as follows:

- (1) Exceptions may be approved by the department, but additional time will not be authorized for the sole purpose of releasing the wild animal outside the hunting season for that species.
- (2) Migratory birds may only be possessed in accordance with the permit holder's federal migratory bird permit.
- (3) Turtles with shell fractures may be possessed for up to two (2) years if housed separately from all other turtles.

(r) All white-tailed deer that are taken in for rehabilitation and determined to be nonreleasable must be euthanized. Not more than twenty (20) white-tailed deer may be taken in for rehabilitation by a permit holder in one (1) calendar year.

(s) A mammal, nonmigratory bird, reptile, or amphibian taken in for rehabilitation that is:

- (1) diseased;
 - (2) severely injured, unless determined by a licensed veterinarian to be treatable and released within one hundred eighty (180) days from the date obtained by the licensed rehabilitator; or
 - (3) a turtle with a shell fracture unless determined by a licensed veterinarian to be treatable and released within two (2) years;
- must be euthanized.

(t) Euthanasia must be carried out with the:

- (1) safest;
 - (2) quickest; and
 - (3) most painless;
- available method as recommended and approved by the division of fish and wildlife.

(u) Carcasses of wild animals that are euthanized or otherwise die while in the care of a permit holder must be:

- (1) buried;
- (2) incinerated on private property with prior permission of the landowner;

- (3) given to a veterinarian or landfill for proper disposal;
- (4) put in the trash if double-bagged;
- (5) if euthanized with chemicals, disposed of only according to the chemical label;
- (6) kept for educational purposes only if the permit holder also has a special purpose salvage permit issued under section 13.5 of this rule;
- (7) donated to a properly licensed university or other educational or scientific institution that has a special purpose salvage permit issued under section 13.5 of this rule; or
- (8) donated to a person with a permit from the United States Fish and Wildlife Service for Native American religious purposes.

~~(k)~~ (v) A permit holder must not:

- (1) commercially advertise rehabilitation services or solicit for rehabilitation a wild animal that is subject to this section;
- (2) have a wild animal spayed or neutered or in any way have their reproductive function altered; or
- (3) mark or tag the wild animals in any way, such as with a collar or ear tag, except as required in subsection (n)(2) or in writing from the department.

(w) A permit holder must notify the department within twenty-four (24) hours of acquiring an endangered species or a bald or golden eagle, whether live or dead, and the location and date of acquisition.

(x) A permit holder must notify the department within twenty-four (24) hours if the permit holder has reason to believe that a wild animal has been subjected to criminal activity.

(y) Wild animals, including their carcasses and parts, possessed under this section must not be sold, bartered, or transferred to another individual or to a permit holder's game breeder license except:

- (1) as authorized in subsection (u); or
- (2) a live wild animal may be transferred to another individual with a permit under this section.

(z) A copy of the permit issued under this section must be possessed by the permit holder when transporting a wild animal possessed under this section to another location and be available and on-site when possessing and caring for wild animals authorized under this section.

~~(t)~~ (aa) A permit may be suspended, denied, or revoked under IC 4-21.5 if the permit holder fails to comply with any of the following:

- (1) A permit issued under this section.
- (2) This article or IC 14-22.
- ~~(3) Another applicable state, local, or federal law.~~

AGENDA ITEM #11

(Natural Resources Commission; 312 IAC 9-10-9; filed May 12, 1997, 10:00 a.m.: 20 IR 2730; readopted filed Jul 28, 2003, 12:00 p.m.: 27 IR 286; filed Sep 23, 2004, 3:00 p.m.: 28 IR 550; readopted filed Nov 24, 2008, 11:08 a.m.: 20081210-IR-312080672RFA)



***Baylisascaris* Infection**
(bay-liss-ass-kuh-ris)
Raccoon Roundworm Infection

What is *Baylisascaris* infection?

Baylisascaris, an intestinal raccoon roundworm, can infect a variety of other animals, including humans. The worms develop to maturity in the raccoon intestine, where they produce millions of eggs that are passed in the feces. Released eggs take 2-4 weeks to become infective to other animals and humans. The eggs are resistant to most environmental conditions and with adequate moisture, can survive for years.

How do humans become infected?

People become infected when they accidentally ingest infective eggs in soil, water, or on objects that have been contaminated with raccoon feces.

When humans ingest these eggs, they hatch into larvae in the person's intestine and travel throughout the body, affecting the organs and muscles.

Who is at risk for infection?

Anyone who is exposed to environments where raccoons live is potentially at risk. Young children or developmentally disabled persons are at highest risk for infection when they spend time outdoors and may put contaminated fingers, soil, or objects into their mouths. Hunters, trappers, taxidermists, and wildlife handlers may also be at increased risk if they have contact with raccoons or raccoon habitats.

How common is *Baylisascaris* infection in raccoons?

Fairly common. Infected raccoons have been found throughout the United States, mainly in the Midwest, Northeast, middle Atlantic, and West coast. Infection rarely causes symptoms in raccoons. Predator animals, including dogs, may also become infected by eating a smaller animal that has been infected with *Baylisascaris*.

How do raccoons become infected?

Raccoons become infected in one of two ways:

- Young raccoons become infected by eating eggs during foraging, feeding, and grooming.
- Adult raccoons acquire the infection by eating rodents, rabbits, and birds infected with the larvae of *Baylisascaris*.

How common is *Baylisascaris* infection in humans?

Infection is rarely diagnosed. Fewer than 25 cases have been diagnosed and reported in the United States as of 2003. However, it is believed that cases are mistakenly diagnosed as other infections or go undiagnosed. Cases have been reported in Oregon, California, Minnesota, Illinois, Michigan, New York, and Pennsylvania. Five of the infected persons died.

What are the symptoms of *Baylisascaris* infection in humans?

Symptoms of infection depend on how many eggs are ingested and where in the body the larvae migrate (travel to). Once inside the body, eggs hatch into larvae and cause disease when they travel through the liver, brain, spinal cord, or other organs. Ingesting a few eggs may cause few or no symptoms, while ingesting large numbers of eggs may lead to serious symptoms. Symptoms of infection may take a week or so to develop.

Symptoms include

- Nausea
- Tiredness
- Liver enlargement
- Loss of coordination
- Lack of attention to people and surroundings
- Loss of muscle control
- Coma
- Blindness

Other animals (except raccoons) infected with *Baylisascaris* can develop similar symptoms, or may die as a result of infection.

What should I do if I think I have ingested *Baylisascaris* eggs?

If you suspect you have been infected, consult your health care provider immediately. Be sure to report that you have recently been exposed to raccoons or their feces.

How is infection diagnosed?

Infection is difficult to diagnose and often is made by ruling out other infections that cause similar symptoms. Information on diagnosis and testing can be obtained through DPDX or your local health department.

How should I clean up raccoon feces?

You should clean up very carefully. To eliminate eggs, feces and material contaminated with raccoon feces should be removed and burned, buried, or sent to a landfill. Care should be taken to avoid contaminating hands and clothes. The use of gloves and facemask will help prevent cross contamination. Treat feces-soiled decks, patios, and other surfaces with boiling water. Always wash hands well with soap and running water, to help further reduce possible infection.

Is treatment available?

Early treatment might reduce serious damage caused by the infection. Should you suspect you may have ingested raccoon feces, seek immediate medical attention.

How can I prevent infection in myself, my children, or my neighbors?

- Avoid direct contact with raccoons -- especially their feces. Do not keep, feed, or adopt raccoons as pets! Raccoons are wild animals.
- Discourage raccoons from living in and around your home or parks by
 - preventing access to food
 - closing off access to attics and basements
 - keeping sand boxes covered at all times, (becomes a latrine)
 - removing fish ponds - they eat the fish and drink the water

- o eliminating all water sources
- o removing bird feeders
- o keeping trash containers tightly closed
- o clearing brush so raccoons are not likely to make a den on your property.
- Stay away from areas and materials that might be contaminated by raccoon feces. Raccoons typically defecate at the base of or in raised forks of trees, or on raised horizontal surfaces such as fallen logs, stumps, or large rocks. Raccoon feces also can be found on woodpiles, decks, rooftops, and in attics, garages, and haylofts. Feces usually are dark and tubular, have a pungent odor (usually worse than dog or cat feces), and often contain undigested seeds or other food items.
- **To eliminate eggs, raccoon feces and material contaminated with raccoon feces should be removed carefully and burned, buried, or sent to a landfill.** Care should be taken to avoid contaminating hands and clothes. Treat decks, patios, and other surfaces with boiling water or a propane flame-gun. (Exercise proper precautions!) Newly deposited eggs take at least 2-4 weeks to become infective. Prompt removal and destruction of raccoon feces will reduce risk for exposure and possible infection.
- Contact your local animal control office for further assistance.

This fact sheet is for information only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health care provider. If you have any questions about the disease described above or think that you may have a parasitic infection, consult a health care provider.

Revised September 23, 2004



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
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What is Canine Distemper?

Canine distemper is a highly contagious and serious disease caused by a virus that attacks the respiratory, gastrointestinal, and, often, the nervous systems of puppies and dogs. The virus also infects wild canids (e.g. foxes, wolves, coyotes), raccoons, skunks, and ferrets.



How is Canine Distemper virus spread?

Puppies and dogs usually become infected through airborne exposure to the virus contained in respiratory secretions of an infected dog or wild animal. Outbreaks of distemper tend to be sporadic. Because canine distemper also affects wildlife populations, contact between wild canids and domestic dogs may facilitate spread of the virus.

What dogs are at risk?

All dogs are at risk but puppies younger than four months old and dogs that have not been vaccinated against canine distemper are at increased risk of acquiring the disease.

What are some signs of Canine Distemper?

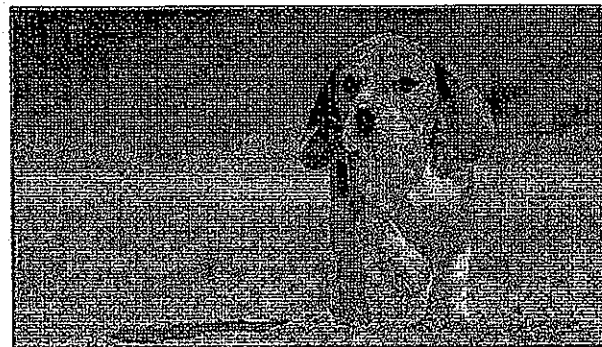
The first sign of distemper is eye discharge that may appear watery to pus-like. Subsequently, dogs develop fever, nasal discharge, coughing, lethargy, reduced appetite, vomiting, and diarrhea. In later stages, the virus may attack the nervous system, bringing about seizures, twitching, or partial or complete paralysis. Occasionally, the virus may cause footpads to harden. Distemper is often fatal. Even if a dog does not die from the disease, canine distemper virus can cause irreparable damage to a dog's nervous system. Distemper is so serious and the signs so varied that any sick dog should be taken to a veterinarian for an examination and diagnosis.

How is Canine Distemper diagnosed and treated?

Veterinarians diagnose canine distemper on the basis of clinical appearance and laboratory tests. No specific drug is available that will kill the virus in infected dogs. Treatment consists primarily of efforts to prevent secondary infections; control vomiting, diarrhea, or neurologic symptoms; and combat dehydration through administration of fluids. Ill dogs should be kept warm, receive good nursing care, and be separated from other dogs.

How is Canine Distemper prevented?

Vaccination and avoiding contact with infected animals are key elements of canine distemper prevention.



Vaccination is important. Young puppies are very susceptible to infection, particularly because the natural immunity provided in their mothers' milk may wear off before the puppies' own immune systems are mature enough to fight off infection. If a puppy is exposed to canine distemper virus during this gap in protection, it may become ill. An additional concern is that immunity provided by a mother's milk may interfere with an effective response to vaccination. This means even vaccinated puppies may occasionally succumb to distemper. To narrow gaps in protection and optimally defend against canine distemper during the first few months of life, a series of vaccinations is administered.

Until a puppy has received its complete series of vaccinations, pet owners should use caution when taking their pet to places where young puppies congregate (e.g. pet shops, parks, puppy classes, obedience classes, doggy daycare, and grooming establishments). Reputable establishments and training programs reduce exposure risk by requiring vaccinations,



health examinations, good hygiene, and isolation of ill puppies and dogs.

To protect their adult dogs, pet owners should be sure that their dog's distemper vaccination is up-to-date. Ask your veterinarian about a recommended vaccination program for your canine companion.

Contact with known infected dogs should always be avoided. Similarly, contact with raccoons, foxes, skunks, and other potentially infected wildlife should be discouraged.

Although this brochure provides basic information about canine distemper, your veterinarian is always your best source of health information. Consult your veterinarian for more information about canine distemper and its prevention.

And Now A Note On Your Pet's General Good Health

A healthy pet is a happy companion. Your pet's daily well-being requires regular care and close attention to any hint of ill health. The American Veterinary Medical Association suggests that you consult your veterinarian if your pet shows any of the following signs:

- Lumps or swelling
- Reduced or excessive appetite or water intake
- Marked weight loss or gain
- Limping, stiffness, or difficulty getting up or down
- Difficult, discolored, excessive or uncontrolled waste elimination (urine and feces)
- Abnormal discharges from any body opening
- Head shaking, scratching, licking, or coat irregularities
- Changes in behavior or fatigue
- Foul breath or excessive tartar deposits on teeth

Pets age more rapidly than people and can develop disease conditions that can go unnoticed, even to the most attentive pet owner. Veterinarians are skilled in detecting conditions that have gradual onset and subtle signs. Early detection allows problems to be treated most easily and affordably. Help foster early detection and treatment by scheduling regular examinations.



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What you should know about Canine Distemper



CARING FOR ANIMALS
Today • Tomorrow • Always

Recommendations of a national working group on prevention and control of rabies in the United States

Article III: Rabies in wildlife

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*Other members of the Working Group are listed at the end of the article.

The complexity of controlling rabies has increased dramatically in the United States since wildlife began to replace domestic dogs as the principal disease vector > 40 years ago. Extensive use of veterinary clinics for parenteral vaccination of domestic dogs, observation of the suspect biting animal, and public education campaigns (together with the application of postexposure prophylaxis [PEP] following a dog bite) during the 1950s and 1960s were effective, simple strategies for the management of rabies in dogs. However, these strategies were not directly applicable to the management of rabies in wildlife.

Management of rabies in wildlife is complicated by the ecologic and biologic factors associated with wildlife reservoirs, the multiagency approach needed to manage an important public health problem originating in wildlife, the limitations of available control methods, and the broad range of public attitudes toward wildlife. In addition, there are several variants of the rabies virus in the United States.^{2,3} These are associated with terrestrial carnivores, including raccoons, skunks, and arctic, red, and gray foxes; a number of variants are also found in a variety of species of bats. Recently, an apparent viral shift or adaptation developed with a variant of the virus in canids at the United States-Mexico border area, resulting in local transmission among coyotes and dogs in south Texas.⁴ Compounding the problem, animals infected with this variant were translocated to other states.⁵ There are equally important biologic, behavioral, and ecologic differences among carnivores that imply inherent differences in disease control approaches to each major reservoir.

It is often difficult to examine the precise epizootic characteristics of rabies as it spreads among animals of a given population. Also, the role of reservoir host abundance and demography is poorly understood. However, it is possible to make several generalizations from passive surveillance data and trends in the reporting of cases of rabies in animals, especially from detailed studies of red fox populations in Europe. Where measures of carnivore abundance exist, the incidence of rabies in animals (presumably all species) is often positively associated with the increasing density of a dominant reservoir species.⁶ In general, rabies epizootics affecting carnivores spread in wavelike fashion; the area experiencing the current epizootic is the crest, and the locale with low reservoir-host populations is the trough.⁷ Rabies is viewed as a density-dependent disease, and population dynamics of reservoir hosts are regarded as critical to understanding and modeling the temporal and spatial patterns of rabies in wildlife.^{8,9} In part, the rate of spread of rabies in populations of a particular species can be related to, or modeled by, its social structure, dispersal patterns, and contact rates.^{9,10,11} Habitat features, such as continuity and patch size, may play a role in the rate of spread and persistence of the disease.^{12,13} Furthermore, interactions among species complicates the understanding of the ecologic and epidemiologic factors associated with rabies.¹⁴ Spillover of infection from the dominant reservoir of a region to other species has been documented,² but the processes by which new variants and epizootics of rabies virus emerge in different reservoir species are unknown. After an epizootic has abated, terrestrial reservoir populations decrease, and reports of rabies in animals in a given locale can decline precipitously. An apparent host threshold density has been suggested as necessary for rabies to perpetuate in red fox populations.¹⁵ Below this threshold, contacts appear too few to continue transmission. The threshold phenomenon has not been well studied in other species, although it is presumed to exist. In addition, immunity in surviving members of the reservoir population has been suggested for several species following an epizootic of rabies.¹⁴ The influence of herd immunity and population recovery time in the recrudescence of rabies in enzootic areas are largely unstudied for the terrestrial rabies reservoirs; the situation is similar for the various species of bats and diverse rabies virus variants of bats.

There are a number of approaches for management of rabies in wildlife, such as reduction of vector populations, modification of habitats, parenteral vaccination through trap-vaccinate-release (TVR) programs, oral vaccination, and passive disease surveillance. In addition, immunocontraception for limiting wildlife populations and modulating density-related disease is an intriguing and rapidly progressing area of research, although it is still considered highly experimental.¹⁶ These various methods could be used alone or in combination. The utility of wildlife control methods, either independently or in an integrated control program, will depend in large part on the overall objectives. Objectives for the control of rabies may vary regionally, from state to state, and within a state. State wildlife agencies with the statutory authority to manage wild animals may not universally endorse the same management strategy as their respective state public health agencies. Moreover, the existence of rabies reservoirs in multiple states (with the exception of mongooses and their unique rabies virus variant in Puerto Rico) makes strategic control of rabies a national issue. Oral vaccination programs for carnivores are in developmental or early operational stages, and their field efficacy, costs, and benefits remain uncertain. Conventional management approaches, such as long-term, federally supported population reduction on a broad scale, no longer appear justified relative to social acceptability, cost, and efficacy. Lastly, wildlife reservoir species, unlike domestic animals, are natural resources; therefore, public input is essential in helping to determine the methods used to manage rabies among these animals.

Rabies Vector Population Reduction

Historically, population reduction has been used to control rabies on the premise that densities of susceptible animals can be reduced below a threshold necessary for rabies to spread through populations.¹⁸ The efforts to control rabies in skunks in Alberta, Canada represents one of the only recent, documented, and broader-scale uses of population reduction in North America conducted explicitly to control rabies. Success of the control program in Alberta was attributed to a high level of effort during several years, the well-defined behavior of skunks in prairie habitats, and access to an effective method.¹⁹ Compensatory changes in carnivore reproduction and dispersal can limit the effectiveness of controlling population numbers of other species in different conditions.^{9,20}

Population reduction with toxicants is impractical as a broadscale control alternative for rabies in the United States. Presidential Executive Order 11643, issued in 1972, banned the use of toxicants (compound 1080, strychnine, sodium cyanide, and thallium sulfate) for control of predators.²¹ The M-44 cyanide capsule has been reregistered with some applicability for controlling rabies vectors (coyotes and red and gray foxes).²² In addition, research conducted by USDA Animal Damage Control (recently renamed Wildlife Services) has led to the development of a large gas cartridge that may be used for lethal elimination in dens of skunks, coyotes, and red foxes. Similarly, there is a commercially produced gas cartridge for use on denning skunks (also with moles, woodchucks, or other rodents). Various types of traps and aerial and ground shooting could potentially be used with toxicants in an integrated population reduction strategy to control rabies in some species. However, trapping and shooting options for population reduction of wildlife species would require the opportunity for extensive review by and input from all potentially affected stakeholders.

The estimated costs of population reduction vary widely^{18,23}; however, such efforts would most likely be cost prohibitive if programs relied on labor-intensive trapping and shooting.¹⁸ Other issues, such as impacts to nontarget species²⁴ and limited public support for population reduction efforts, clearly restrict the feasibility of this approach as a single tactic for broad-scale control of rabies. Presently, population reduction is most likely to be publicly accepted and effective in localized or site-specific scenarios in the United States (eg, reducing the density of raccoon populations in parks where visitors may come in contact with potentially rabid animals). The use of intensive local population reduction as a contingency to address outbreak foci remains untested. Population reduction also may continue to merit consideration for species or situations in which all other methods are not practical.

Habitat Modification

Habitat modification is a useful site-specific management approach that can reduce the chance of interaction between human beings and potential vectors like skunks, raccoons, and bats. Managing refuse through routine garbage pickup, using animal-proof garbage receptacles, making pet food inaccessible to wild animals, capping chimneys, and screening lower vents are examples of habitat manipulation to minimize contact between wild animals, pets, and people. Techniques designed to prevent access of bats to human living quarters can minimize PEP considerations.

Trap-Vaccinate-Release Programs

A TVR program was implemented in Toronto in 1984¹¹ as an interim measure to control rabies in skunks until an oral rabies vaccine (ORV) could be developed. Inactivated rabies virus vaccine was injected IM into live-trapped skunks. Serum samples from recaptured animals indicated that a high level of population immunity was effective in reducing rabies in Toronto. Costs were relatively high (\$450 to \$1,150/sq km [US dollars]) for the TVR program in Toronto, but these costs may be offset partially by a reduction in the number of people receiving PEP.²⁵ Similarly, there have been TVR programs targeting raccoons on the Delmarva (Delaware, Virginia, and Maryland) peninsula,²⁶ in Philadelphia,²⁷ and in Ithaca, NY.²⁸ A TVR program is also being implemented along the Ontario boundary of the Niagara Frontier in an attempt to provide a barrier against the invasion of rabid raccoons.

Oral Rabies Vaccination

After the concept was conceived at the Centers for Disease Control and Prevention (CDC) during the 1960s, oral vaccination of red foxes with attenuated Evelyn-Rokitnick-Abelseth vaccine was demonstrated in the early 1970s.²⁹ The intensity of rabies in foxes in Europe stimulated the further development of vaccines and delivery systems,²⁷ and these efforts were supported by the World Health Organization. Early control efforts included ground and aerial delivery of rabies vaccine in blister packs inserted in chicken head baits. Oral vaccination in Europe has since progressed to include the use of several efficacious vaccines, including attenuated and recombinant rabies vaccines, in a variety of commercial baits; these are distributed through a combination of ground and aerial bait distribution methods.²⁸ During 1999, Switzerland, which had a long enzootic for rabies in red foxes and was the first country to use ORV in wildlife in 1978, was declared free of rabies.

In 1989, a similar ORV program was implemented in southern Ontario. Efforts in Ontario throughout the past decade have been promising and have greatly advanced aerial bait delivery with fixed-wing aircraft over large, homogenous areas of land.²⁹ The ultimate objective of eliminating the arctic fox variant of the rabies virus, which is transmitted among red foxes in the region, may hinge in part on cooperation with neighboring northeastern states and provinces.

Although oral vaccination shows promise for control of rabies among some terrestrial vectors, many important questions regarding baits, optimal baiting strategies, and relevant techniques for control of rabies in bats remain unanswered.¹ Subsequent to placebo baiting studies to evaluate the feasibility of oral vaccination,³⁰⁻³² the potential benefits of oral vaccination have been questioned.³³ In contrast, the public is often supportive of novel control methods,³⁴ despite the infancy of oral vaccination for control of rabies among terrestrial vectors in the United States. To warrant consideration as a public health intervention, efficacy of oral vaccination must be proven, and desirable cost-benefit ratios or a willingness to pay among the general public or other stakeholders will be required.³⁵⁻³⁶

In the United States, international and multidisciplinary collaborative efforts led to the development of a vaccinia-rabies glycoprotein (V-RG) recombinant virus vaccine for use in raccoons.^{37,42} In 1997, the results of safety and efficacy field trials led to full licensure of the V-RG vaccine for use in state or federally approved oral vaccination projects targeting raccoons.⁴³ To date, the V-RG vaccine has been used in > 10 completed or ongoing field projects for control of rabies in raccoons.^{1,44} The potential effectiveness of oral vaccination at containing epizootic fronts was first described in New Jersey⁴⁵ at the Cape May peninsula and subsequently at the Cape Cod isthmus in Massachusetts.⁴⁶ The first suppression of rabies in an enzootic area was described in the Capital Region of New York.¹ Additional ongoing pilot studies have yet to generate substantial data on which to base operational plans for control of rabies through oral vaccination.¹ However, it is clear that federal involvement in strategic oral vaccination efforts involving multiple states will be essential if the ultimate goal is elimination of a particular terrestrial variant of rabies virus. In addition to pilot studies for control of rabies in raccoons, the V-RG vaccine is also being used in an effort to prevent the spread of rabies among gray foxes in west Texas and among coyotes in south Texas.⁴⁷

Surveillance

Surveillance is integral to all efforts of rabies control. Surveillance should be pursued more aggressively and with an analytic design during control field trials to objectively evaluate effectiveness. National typing of rabies virus variants should be continued, because such efforts would lead to better understanding of the spatial and temporal distribution of different variants. Such information is essential in view of the differences in behavior and population dynamics and structure among the major wildlife vectors. If regional control efforts directed at specific variants of the virus are initiated, historic and current surveillance data on variants will be needed. Basic passive surveillance will be insufficient for monitoring the effect of oral vaccination on rabies in wildlife.

Contraception

Interest in oral contraception in wildlife began in the early 1960s as a means to control coyote populations causing livestock depredations in the west and red fox populations responsible for the spread of rabies in the eastern United States.⁴⁸ Research efforts with the reproductive inhibitor diethylstilbestrol had promise,⁴⁹ but these were abandoned because of the lack of safe, effective, long-lasting agents, and effective delivery systems. Recently, contraception has regained attention as a means of controlling wildlife populations.⁴⁸ Advances in genetic technology since the 1960s have led to the development of immunocontraceptives.^{50,52} Nevertheless, field delivery of oral immunocontraceptives presents many of the same challenges that confronted researchers of oral rabies vaccination in the 1960s. Much work remains to develop safe and effective delivery systems.^{46,50,53,54} In addition, many stakeholders will have a voice in defining the conditions under which immunocontraceptives could be acceptably applied.⁵⁵

Recommendations—A better understanding of the complex interaction of host factors (eg, density dependent changes in reproduction, survival, and dispersal, and level of immunity in the surviving population) and viral characteristics involved in epizootic and enzootic transmission of rabies in wildlife populations is necessary. Surveillance systems that include detailed ecologic or epidemiologic data are needed. Explicit descriptions of the impact of rabies on the population dynamics of carnivores and the potential effect of interventions, such as oral vaccination, are fundamentally lacking and critically needed. Educational materials for the public on rabies in wildlife and potential control measures also are inadequate or lacking. Practical and effective vaccines that generate immunity to rabies or inhibit reproduction in specific species are needed. Basic dynamics, movement, and dispersal patterns of rabies vectors should be more fully investigated, particularly in relation to proposed disease control through oral vaccination or other techniques. Professional societies with diverse interests (ecology, mammalogy, wildlife biology, virology, and epidemiology) should collaborate and inform their members of activities in related fields through solicited papers and symposia. More complete species identification on animals, such as bats, submitted for testing should be completed by trained diagnostic laboratory personnel or through collaboration with mammalogists to correct potential laboratory personnel limitations with regard to taxonomic classification of animals submitted for diagnosis of rabies.

In addition to rabies surveillance of wildlife through conventional passive public health submissions, strategic application of active surveillance, such as at epizootic fronts and in areas implementing oral vaccination, will be critical. More effective use of available sources of data should be considered, including augmenting surveillance data collection at the state level. Information on specific geographic location and disease status of all animals submitted for testing should be reported and retained. Existing surveillance systems should be integrated within geographic information system databases, especially databases that would enable classification of habitat features. This would facilitate the understanding of the population dynamics and habitat relationships of reservoir species and potential spread of disease. Educational materials on rabies in wildlife and potential control measures need to be compiled and made available for widespread public distribution as requested by the public. The potential benefits of oral vaccination and other integrated control strategies should be thoroughly described for various major application strategies, such as suppression of local intensity of rabies, containment of an epizootic front, and proposed elimination of a terrestrial rabies variant. Research leading toward the development of practical contraceptives or related technology for managing wildlife populations should be encouraged and supported. Symposia that bring veterinarians, wildlife managers, and other stakeholders together for collaboration on management strategies should be conducted.

Authority for Management of Rabies in Wildlife

Timely and appropriate response concerning human or domestic animal exposure to rabies should be a local action. However, it is important for responses to be standardized and based on sound public health policy that requires protocols be developed at the state level, using national guidelines.⁵⁶ At the local level, a variety of agencies and individuals may be involved in managing exposure to rabies (eg, animal control officers, health department personnel, emergency room staff, and veterinarians). This multiagency involvement can be confusing for many citizens who may not know the responsible party to call in the event of an exposure. Such confusion can also lead to lack of coverage when clear lines of responsibility are not stated. Recommendations have been prepared by the National Association of State Public Health Veterinarians and the Advisory Committee on Immunization Practices, but these guidelines do not address specific logistic issues at the local level.

Recommendations—State and local task forces consisting of representatives of all involved agencies should be formed to make recommendations for improving communication and

coordination at both levels. The health department should be the single authority at the local (city, county, or town) and state levels designated to establish protocols for the management of human exposure to wildlife and to ensure that protocols are followed. State health departments, cooperating with other state agencies (eg, agriculture, wildlife) and using information from recognized national authorities, should provide localities with guidelines and protocols, including those for the scientific rationale for managing wild and domestic animals that potentially expose humans or domestic animals. The public should be notified by various means as to appropriate contacts in the event of an exposure. The system of reporting exposures should be simple and should include 24-hour coverage for nights, weekends, and holidays. If local police or animal control dispatchers receive the information, it should be transmitted to the appropriate individual or agency (eg, health department, animal control, game warden) for response. In all instances, procedures should ensure that the health department is notified of any suspected exposure to rabies. Records should be kept of all potential exposures and eventual outcomes.

Management of Wildlife to Minimize Transfer of Disease

Throughout history, wild animals have been captured, moved, and released by human beings. In a report by Nielsen,⁵⁷ conservation, ecology, commerce, recreation, and humanitarian concerns were cited as the primary reasons for translocation of wildlife. Many benefits may be derived through translocation of wild animals, such as restoration of rare or endangered species and expansion of genetic variability of specific isolated populations. However, translocation of animals also has the potential for significant negative impact, particularly with regard to inadvertent transfer of pathogens. For example, there is evidence that the 1977 mid-Atlantic focus of the rabies epizootic in raccoons was the result of long-distance translocation of infected raccoons from the southeastern United States.^{58,59} More recently, the coyote-dog variant of the rabies virus, previously known only from the United States-Mexico border,⁴ was diagnosed in American Foxhounds in Alabama and Florida.⁶ The cases were linked to commercial fox-chasing pens⁶¹ that had stocked coyotes⁶ and were contained. Intensive use of commercial enclosures created a need to restock animals and led to interstate commercial traffic in wild-caught foxes and coyotes.^{61,62} In response, state regulations regarding fox-chasing enclosures and sale of live foxes and coyotes are rapidly evolving,⁶³ but compliance remains a problem.⁶² In another recent incident, rabies was diagnosed in gray foxes transported from Texas to Montana. Genetic analysis revealed that the isolate was a gray fox variant found in west Texas.³ Similar episodes have involved the translocation of bats from the United States to Europe.

Short-distance relocation of nuisance wildlife may also affect the local incidence of rabies. The most important reservoirs, such as raccoons, skunks, foxes, and various species of bats, are capable of living in close association with people, particularly where "suburbanization" results in adequate shelter and food. Nuisance wildlife are killed or captured and removed by property owners, private pest control operators, licensed commercial trappers, and municipal, state, or federal animal control or wildlife management personnel. Often, landowners express a strong desire that the animals be removed unharmed and transported elsewhere for release. Although relocation is often local, this transportation of animals may provide a mechanism for rabies to spread more rapidly into contiguous, susceptible populations or to surmount geographic or artificial immunologic barriers, such as those caused by oral vaccination of rabies in wildlife.

Recommendations—Stronger and more uniform federal and state wildlife regulations are necessary to prevent indiscriminate international, interstate, and intrastate movement and release of wild carnivores by private citizens. Effective enforcement of state wildlife regulations is necessary to deal with intrastate relocation of wild carnivores. Guidelines are critically needed for determining when nuisance wildlife should be euthanatized instead of being released. Regulations pertaining to the live release of nuisance animals that are vectors for rabies need to be more restrictive. Under the jurisdiction of the state's wildlife, agriculture, or public health agency, each state should have or develop regulations regarding the rehabilitation, capture, holding, sale, and release of wildlife, particularly the importation of wild-caught carnivores.

States with endemic rabies in a given species should develop regulations prohibiting—except under special permit—the assembly of live, wild animals of that species for any purpose including intra- or interstate sales. Violations of state regulations on import of wild animals should be prosecuted through a joint effort between the state and the US Fish and Wildlife Service, thereby activating the penalties associated with violations of the Lacey Act.⁶⁴

Public education programs should be developed to explain public health risks and the need for regulations on relocation of wildlife. Information should address the zoonotic disease risks issues associated with translocation of wildlife. Stronger federal regulation of international animal importation, including the prohibition, quarantine, or restricted movement of exotic species capable of introducing or perpetuating nonindigenous Lyssaviruses, is required.

Implementation of Vaccination Programs for Wildlife

Use of ORV in the United States is restricted by the USDA to state or federally approved control programs targeting raccoons, with additional applications underway in Texas targeting coyotes and gray foxes. Parenteral vaccines have not been licensed for use in wildlife. Use of ORV should be reserved for large-scale attempts to eliminate or reduce the impact of an outbreak of rabies in wildlife or to limit entry of rabies from wildlife into an area; ORV should not be used for the vaccination of individual animals. Currently, there is no officially delegated lead agency to monitor or evaluate the use of ORV once they are fully licensed.

Recommendations—A national strategy should be formulated for the use of ORV in wildlife, and a federal agency should be designated to lead wildlife vaccination efforts. A single agency within each state should be designated to coordinate rabies vaccination programs in consultation with the other involved agencies. Oral vaccination programs should be optimized through investigations of various bait densities and distribution methods. The CDC should provide technical laboratory and logistic assistance in the conduct, coordination, and surveillance evaluation of state programs, including communication and coordination with other participating state and federal agencies. The USDA should assist in implementation of control programs. Universities and other groups could play various roles, including research, evaluation, and technical support; however, these roles should be secondary to the activities of state and federal agencies. State authorities from public health agencies and either the designated public health veterinarian or the state veterinarian from agriculture departments should have ultimate responsibility for the conduct, supervision, coordination, and termination of wildlife vaccination programs in their respective states. These activities should be coordinated between state departments of agriculture and wildlife. This effort can be expedited by the formation of an interdepartmental task force or committee representing at least those 3 agencies responsible for public health, agriculture, and wildlife. Other potential members for such a task force include private and academic veterinary and human medical practitioners and biomedical researchers.

Since the meeting of the 1995 working group, measurable, but somewhat limited, progress has been made toward control of rabies in wildlife. More areas are using ORV since the vaccine has become licensed. Further westward advancement of rabies in raccoons appears to have been stalled by a considerable ORV effort in the first affected Ohio counties, adjacent to Pennsylvania. However, the recent advancement of rabies northward from New York to eastern Ontario, despite prevention measures in the area (ORV in New York and TVR in Ontario), exemplifies the weakness of current control methods and the lack of guidelines toward efficacious application. Application of ORV in Texas has restricted the progression of rabies in coyotes and gray foxes. Clearly, ORV and other management methods are currently novel tools in the prevention and control of rabies in the United States. For these control methods to become practical, numerous aspects of the various techniques will require additional development and evaluation. Economic analysis and field assessment is in progress.

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^aGamer N. A two year Trap-Vaccinate-Release program targeting raccoons on the Delmarva Peninsula. Maryland Department of Health: Unpublished report, 1989.

^bMarkey B, Dieter JA, Nuss JL, et al. An experimental trap-vaccinate-release program for urban raccoon rabies control (abstr), in *Proceedings, 38th Annu Conf Wildl Dis Assoc* 1989;49.

^cStehman SM, Bigler LL, Lehn DH. A three year summary of a trap-vaccinate-release rabies vaccination program in central New York with comments regarding public attitudes about wildlife rabies vaccination (abstr), in *Proceedings, 5th Int Meet Rabies Am* 1994;38.

References

1. Hanson CA, Rupprecht CE. The reemergence of rabies. In: Scheld WM, Armstrong D, Hughes JB, eds. *Emerging Infections 1*. Washington, DC: American Society for Microbiology, 1998;59-80.
2. Krebs JW, Smith JS, Rupprecht CE, et al. Rabies surveillance in the United States during 1997. *J Am Vet Med Assoc* 1998; 213:1713-1728.

Public Veterinary Medicine: Public Health

Rabies surveillance in the United States during 2008

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Summary—During 2008, 49 states and Puerto Rico reported 6,841 cases of rabies in animals and 2 cases in humans to the CDC, representing a 3.1% decrease from the 7,060 cases in animals and 1 case in a human reported in 2007. Approximately 93% of the cases were in wildlife, and 7% were in domestic animals. Relative contributions by the major animal groups were as follows: 2,389 (34.9%) raccoons, 1,806 (26.4%) bats, 1,589 (23.2%) skunks, 454 (6.6%) foxes, 294 (4.3%) cats, 75 (1.1%) dogs, and 59 (0.9%) cattle. Compared with numbers of cases reported in 2007, numbers of cases reported in 2008 increased among cats, cattle, and skunks and decreased among dogs, raccoons, bats, and foxes. Numbers of rabid raccoons reported during 2008 decreased in 11 of the 20 eastern states where raccoon rabies was enzootic; overall number of rabid raccoons reported decreased by 8.6% during 2008, compared with 2007.

On a national level, the number of rabies cases involving skunks increased by 7.7% during 2008, compared with the number reported in 2007; this was the first increase in the number of reported rabid skunks since 2006. The total number of cases of rabies reported nationally in foxes decreased 1.7% in 2008, compared with 2007. The 1,806 cases of rabies reported in bats represented a 6.7% decrease, compared with the number reported in 2007. One case of rabies in a dog imported from Iraq was reported at a quarantine station in New Jersey during 2008. Follow-up of potentially exposed animals in the same shipment did not reveal any secondary transmission. The United States remained free from dog-to-dog transmission of canine rabies virus variants. Total number of rabid dogs reported decreased 19.4% in 2008, compared with 2007.

Two human rabies cases were reported from California and Missouri during 2008. The California case involved a recent immigrant from Mexico and was attributed to a newly identified rabies virus variant most likely associated with Mexican free-tailed bats. The case in Missouri was attributed to a rabies virus variant associated with eastern pipistrelle and silver-haired bats.

The present report provides an update on rabies epidemiology and events in the United States during 2008. Summaries of 2008 surveillance data for Canada and Mexico are also provided because of their common borders with the United States and the frequent travel between the United States and these countries. A brief preliminary update on cases of rabies and other related activities reported to the CDC during 2009 is also included.

As is the case in many developed countries, wild animals accounted for the majority (93%) of all rabies

cases in the United States reported to the CDC during 2008. The most frequently reported rabid wildlife were raccoons, bats, skunks, and foxes; however, their relative proportions have continued to fluctuate over the years owing to epizootics of rabies among animals infected with various distinct rabies virus variants.¹

Rabies virus infections involving terrestrial animals in the United States occur in geographically definable regions where virus transmission is primarily between members of the same species. Spillover infection from these species to other animals occurs but rarely initiates sustained transmission in other species. Once established, enzootic virus transmission within a species can persist regionally for decades or longer.

The spatial boundaries of enzootic rabies in reservoir species are temporally dynamic (Figure 1), and affected areas may expand and contract as a result of virus transmission and animal population interactions.^{2,3} Population increases and emigration result in expansion of enzootic areas, whereas natural barriers, such as mountain ranges and bodies of water, may sustain lower population densities or restrict animal move-

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ments, slowing the spread of rabies. Unusual animal dispersal patterns and human-mediated translocation of infected animals have resulted in more rapid or unexpected introduction of rabies into new areas.¹⁻⁶

The canine rabies virus variant, which is responsible for dog-to-dog rabies transmission, was reintroduced in coyotes in the United States in the late 1980s, but, following > 10 years of oral vaccination, has again been eliminated.⁷⁻¹⁰ An ongoing analysis of the phylogenetics of circulating terrestrial rabies virus variants has suggested that canine rabies virus variants were the probable origins of several circulating wildlife rabies virus variants of foxes (Texas and Arizona) and skunks (California and north central United States). This is likely representative of a long process that began with the introduction of canine rabies during colonization of the Americas followed by spillover and adaptation of Old World canine rabies virus variants to New World wildlife species, which have maintained an independent sylvatic circulation of canine origin rabies virus variants.¹¹

Following translocation of rabid raccoons (*Procyon lotor*) from an enzootic area in the southeastern United States to the mid-Atlantic region, raccoon rabies spread rapidly and has become enzootic in all of the eastern coastal states as well as in Alabama, Ohio, Pennsylvania, Tennessee, Vermont, and West Virginia. Three different rabies virus variants are responsible for disease in skunks (primarily *Mephitis mephitis*) in California and the north central and south central United States. In Alaska, a long-standing reservoir for rabies virus exists in arctic and red foxes (*Alopex lagopus* and *Vulpes vulpes*, respectively). Two different rabies virus variants are present in geographically limited populations of gray foxes (*Urocyon cinereoargenteus*) in Arizona and Texas. On the island of Puerto Rico, another wildlife rabies reservoir exists in mongooses (*Herpestes javanicus*).^{12,13}

Distribution of an oral vaccinia-rabies glycoprotein recombinant vaccine targeting raccoons in the eastern United States¹⁴⁻¹⁶ and gray foxes and coyotes (*Canis latrans*) in Texas¹⁰ has shown promise as an important adjunct to traditional rabies control methods (ie, parenteral vaccination of domestic animals). Biologics used in oral vaccination programs contain live replicating virus, and the unintentional exposure of nontarget species, including humans, must be minimized and monitored.¹⁷⁻¹⁹

There are multiple, independent reservoirs of rabies virus in several species of insectivorous bats, with distribution patterns overlaying the distribution of rabies virus variants maintained in terrestrial mammals. Rabies virus transmission among bats appears to be primarily intraspecific, and distinct virus variants can be identified and associated with different bat species. In contrast to maintenance cycles in terrestrial animals, however, the greater mobility of bats precludes defini-

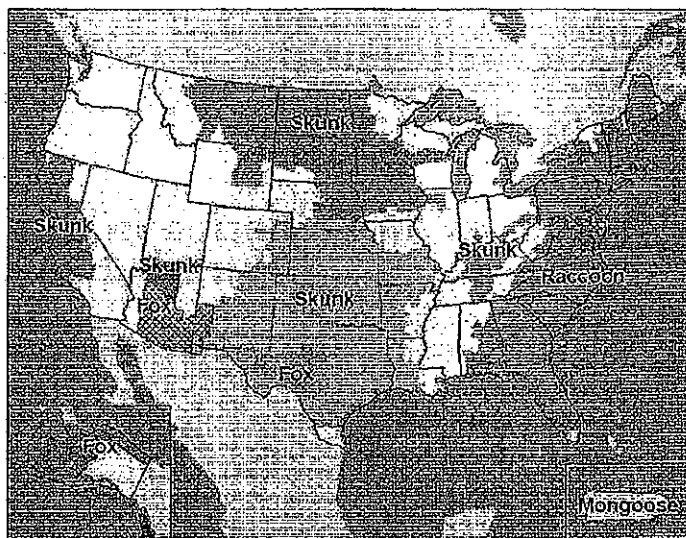


Figure 1—Distribution of major rabies virus variants among wild terrestrial animal reservoirs in the United States and Puerto Rico, 2008.

tive range-mapping of different variants, other than the geographic ranges of the implicated host bat species. Because bat species known to be reservoirs for rabies virus are found in all areas of the continental United States, every state except Hawaii is considered enzootic for rabies.

Various public health activities, including vaccination of companion animals, vaccination programs targeting wildlife, and ongoing education programs, have contributed to the reduction in transmission of rabies virus from terrestrial animals to humans.²⁰ As a result, most cases of rabies in humans have resulted from infection with rabies virus variants associated with bats.^{21,22} Rabies control in bats by conventional methods is difficult, and preventing infection with bat-associated rabies virus variants in humans is further complicated by the frequent absence of documented exposure histories involving a bat bite.

Reporting and Analysis

The number of reported cases of rabies represents only a fraction of the total cases that occur each year. Many rabid animals are never observed and therefore go undetected and untested.²³ The predominantly passive nature of public health and veterinary rabies surveillance programs and the lack of accurate estimates of animal populations mean that incidence and prevalence of rabies cannot be accurately determined for most species. Existing public health reporting systems were not designed for transmission of data involving diseases in animal populations and often lack designated fields for reporting vital information such as animal species.^{24,25} Furthermore, laboratory-based reporting of rabies cases to the CDC is complicated by the presence of multiple laboratories that perform rabies diagnostic testing in some states (eg, public health, agricultural, and veterinary pathology laboratories).

During 2008, 8 states (Georgia, Massachusetts, Maryland, Michigan, North Dakota, Virginia, Vermont, and West

Virginia) transmitted testing data electronically through the use of the updated Public Health Laboratory Isolate Surveillance system, which leverages the Public Health Informatics Network-Messaging System to securely transmit text files in a defined messaging format to a CDC database. With the creation of this electronic, laboratory-based reporting system, the CDC database for rabies surveillance data has been restructured to allow collection of data for individual animals, so that additional data elements can be submitted on each animal, as opposed to the historical reporting of aggregate counts by species and county. The updated Public Health Laboratory Isolate Surveillance system provides a stopgap solution for electronic reporting of animal rabies testing data while standards-based messaging guides for animal rabies reporting are being developed at the federal and state levels. The system's relative ease of use and independence from specific laboratory information systems (most database systems can export data to text files) make its implementation in non-public health laboratories feasible. Additional information provided voluntarily by some state health departments during 2008 included sex, age, and vaccination status of rabid animals; human and animal exposures to rabid animals; coordinate or street address of collection; and variant typing information.

To facilitate consistent reporting from states that do not use the Public Health Laboratory Isolate Surveillance system, all states and territories are requested to submit finalized data directly to the Poxvirus and Rabies Branch of the CDC. In animals suspected of having rabies, a diagnosis was made by detecting rabies viral antigen in brain material submitted to state laboratories by means of a direct immunofluorescent antibody test, as described.²⁶ Virus isolation in neuroblastoma cell cultures or in mice, nucleic acid detection via a reverse transcriptase PCR assay, and sequencing and genetic analysis were used to confirm the diagnosis in some cases. This year, CDC also requested direct reporting of testing activity by USDA Wildlife Services field biologists who were using a direct rapid immunohistochemistry test²⁷ for enhanced rabies surveillance, and information was provided for 7,088 samples, representing 5.8% of all samples reportedly tested during 2008. All samples for which the direct rapid immunohistochemistry test provided positive or indeterminate results and 10% of samples for which the test provided negative results were submitted to the CDC for confirmation by means of the direct fluorescent antibody test.

Between January 1 and December 31, 2008, all 50 states, New York City, the District of Columbia, and Puerto Rico reported numbers of cases of animal rabies to the CDC. All states also provided data on total rabies diagnostic testing activity during 2008. However, county of origin was not reported for animals from the state of Oklahoma for which test results were negative. A total of 121,728 animals were reportedly tested in the United States during 2008, accounting for a 0.7% increase in the number of animals tested, compared with 2007.

For rabies cases involving most terrestrial mammals, state public health laboratories generally report the common name of affected animals, with affected animals typically identified to

the level of genus and often to the level of species. However, for cases involving bats, affected animals are frequently identified only to the level of taxonomic order (ie, Chiroptera) because not all public health laboratories have the capacity to speciate bats, even though they are encouraged to do so.

All year-end totals included in the present report were confirmed through e-mail or telephone conversations with state or territorial health department officials. Data from Canada were obtained from the Terrestrial Animal Health Division, Canadian Food Inspection Agency, and data from Mexico were obtained from the Pan American Health Organization Epidemiological Information System.²⁸

State health authorities have different requirements for submission of specimens for rabies testing; therefore, intensity of surveillance varies. To better estimate regional trends, determine the rigor of surveillance efforts, and identify possible biases, states are encouraged to submit denominator data (ie, data for animals tested, but for which results of direct fluorescent antibody testing were negative) by species, county, and temporal occurrence. Calculations of percentages of positive test results are based on the total number of animals tested for rabies. Because most animals submitted for testing are selected because of abnormal behavior or obvious signs of illness, percentages of tested animals with positive results in the present report are not representative of the incidence of rabies in the general population. Further, because of differences in protocols and submission rates among species and states, comparison of percentages of animals with positive results between species or states is inappropriate. For comparison of historical rates, data from states lacking total submission data were excluded from calculations.

Geographic areas for various rabies virus reservoirs in the United States were produced by aggregating data from 2004 through 2008. County boundaries where cases were reported in the reservoir species over this period were dissolved with a geographic information system²⁹ to produce a single polygon representing the distribution of a specific rabies virus variant. Reservoir maps are an estimate of the relative distribution of each major terrestrial rabies virus variant maintained by a particular reservoir species. Owing to the

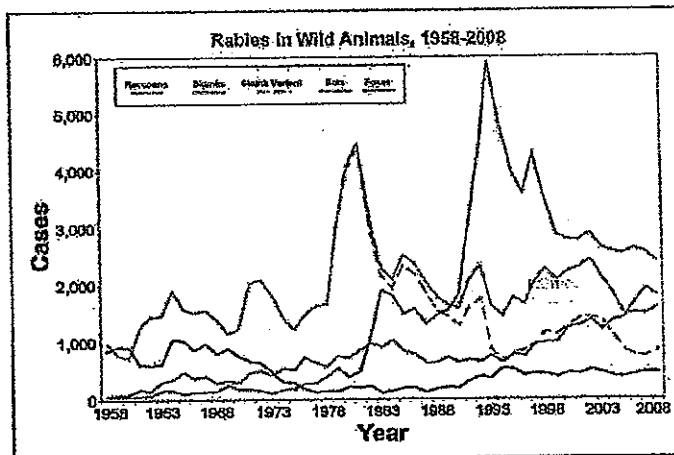


Figure 2—Cases of rabies in wild animals in the United States, by year and species, 1958 to 2008.

paucity of samples tested at some localities and a lack of antigenic typing or genetic sequencing where reservoirs meet, defining precise viral fronts is difficult. Geographic location was provided only to the county

level, and maps represent cases at this jurisdictional level. Because of the positive skew of the data, a geometric classification scheme was used for choropleth maps used to display number of animals tested; pro-

Table 1—Cases of rabies in the United States, by state and category, during 2008.

State (city)	Total cases	Domestic animals								Wild animals							Reptiles and lagomorphs	Hervivores	% Positive 2008	2007 cases	Change (%)
		Domestic	Wild	Cats	Cattle	Dogs	Horses/ mules	Sheep/ goats	Other domestic*	Raccoons	Bats	Skunks	Foxes	Other Wild†							
AK	15	0	15	0	0	0	0	0	0	0	0	0	15	0	0	0	31.2	45	-66.87		
AL	84	2	82	0	0	1	1	0	0	51	17	0	11	3*	0	0	3.8	80	5.00		
AR	49	5	44	0	0	4	0	1	0	0	5	39	0	0	0	0	5.1	23	48.48		
AZ	182	2	180	0	0	1	1	0	0	0	89	57	21	13*	0	0	8.6	159	14.47		
CA	179	1	177	1	0	0	0	0	0	0	137	31	9	0	0	1	2.5	188	-4.79		
CO	65	1	64	1	0	0	0	0	0	1	44	19	0	0	3	0	6.9	55	18.07		
CT	202	11	191	11	0	0	0	0	0	103	40	32	6	3*	1*	0	7.7	219	-7.76		
DC	49	6	43	6	0	0	0	0	0	28	12	0	3	0	0	0	10.9	43	13.95		
DE	21	7	13	6	0	0	1	0	0	7	4	0	1	0	1*	0	8.4	11	90.91		
FL	151	11	140	9	0	0	2	0	0	95	20	2	20	3*	0	0	3.9	128	17.97		
GA	388	24	365	15	1	6	1	0	1*	235	25	62	36	7*	0	0	14.8	301	29.24		
HI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.00		
IA	27	10	17	8	1	1	0	0	0	0	11	6	0	0	0	0	1.7	31	-12.90		
ID	10	0	10	0	0	0	0	0	0	0	10	0	0	0	0	0	2.0	12	-16.67		
IL	103	0	103	0	0	0	0	0	0	0	103	0	0	0	0	0	1.7	113	-6.85		
IN	13	0	13	0	0	0	0	0	0	0	13	0	0	0	0	0	0.8	13	0.00		
KS	67	13	54	11	0	0	2	0	0	0	6	48	0	0	0	0	5.5	110	-39.09		
KY	46	9	37	1	0	6	2	0	0	0	14	23	0	0	0	0	3.5	20	130.00		
LA	6	0	6	0	0	0	0	0	0	0	3	3	0	0	0	0	0.9	9	0.00		
MA	154	18	136	15	0	1	1	1	0	62	19	44	8	1*	2*	0	5.3	152	1.32		
MD	420	27	393	21	2	1	2	1	0	271	33	41	37	0	11**	0	9.2	431	-2.55		
ME	65	0	65	0	0	0	0	0	0	33	8	21	3	0	0	0	9.2	86	-24.42		
MI	78	1	78	1	0	0	0	0	0	0	70	6	2	0	0	0	2.1	210	-62.38		
MN	70	9	61	2	4	3	0	0	0	0	33	28	0	0	0	0	2.4	40	75.00		
MO	66	1	64	0	0	0	1	0	0	0	58	6	0	0	0	1	2.1	38	73.68		
MS	7	0	7	0	0	0	0	0	0	0	7	0	0	0	0	0	2.1	3	133.33		
MT	14	1	13	0	0	1	0	0	0	0	11	2	0	0	0	0	3.3	23	-39.13		
NC	474	25	449	18	3	3	0	1	0	270	18	93	60	7*	1*	0	12.5	474	0.00		
ND	34	14	20	5	4	4	1	0	0	1	1	18	0	0	0	0	7.6	30	13.33		
NE	43	7	36	1	4	0	2	0	0	0	10	25	1	0	0	0	4.0	31	38.71		
NH	58	3	56	1	0	0	0	2	0	28	3	19	6	0	0	0	9.7	54	9.26		
NJ	285	17	268	15	0	2	0	0	0	155	57	44	6	1*	5*	0	8.5	283	0.71		
NM	25	2	23	1	0	1	0	0	0	0	0	6	17	0	0	0	5.8	17	47.06		
NV	16	0	16	0	0	0	0	0	0	0	16	0	0	0	0	0	4.0	9	77.78		
NY	496	31	465	23	6	1	1	0	0	262	112	63	20	3*	5*	0	6.6	512	-3.13		
NYC	19	1	18	1	0	0	0	0	0	9	2	7	0	0	0	0	2.5	47	-59.57		
OH	64	0	64	0	0	0	0	0	0	5	55	3	0	1*	0	0	1.5	86	-25.58		
OK	43	11	32	2	6	2	1	0	0	0	2	29	0	1*	0	0	3.8	76	-44.67		
OR	13	0	13	0	0	0	0	0	0	0	13	0	0	0	0	0	5.1	12	8.33		
PA	431	60	371	53	3	3	0	1	0	228	43	71	25	2**	2**	0	4.8	439	-1.82		
PR	58	16	42	3	1	11	1	0	0	0	0	0	0	42*	0	0	28.3	47	23.40		
RI	34	2	32	1	0	0	1	0	0	9	7	12	4	0	0	0	7.4	45	-24.44		
SC	166	6	159	3	2	1	0	0	0	81	10	34	34	1*	0	0	7.2	162	2.47		
SD	24	4	20	0	2	0	2	0	0	0	4	18	0	0	0	0	3.5	27	-11.11		
TN	128	6	122	2	0	3	1	0	0	28	18	68	7	0	0	0	4.9	132	-3.03		
TX	1,022	45	977	15	9	15	4	2	0	10	549	393	14	6*	0	0	7.1	969	5.47		
UT	14	0	14	0	0	0	0	0	0	0	14	0	0	0	0	0	2.5	16	-12.50		
VA	622	48	574	34	6	4	2	2	0	310	22	158	78	1*	9**	0	14.4	730	-14.79		
VT	76	1	75	0	1	0	0	0	0	41	3	25	3	1*	1**	0	13.3	165	-54.55		
WA	17	0	17	0	0	0	0	0	0	0	17	0	0	0	0	0	3.1	22	-22.73		
WI	24	0	24	0	0	0	0	0	0	0	24	0	0	0	0	0	1.1	26	-7.69		
WV	96	13	83	8	4	0	0	1	0	54	3	18	7	1*	0	0	5.1	77	24.68		
WY	28	0	28	0	0	0	0	0	0	0	12	16	0	0	0	0	4.0	19	47.37		
Total	6,843	471	6,359	294	59	75	30	12	1	2,389	1,806	1,583	494	97	34	2	5.62	7,050	-3.07		
% 2008	100.00	6.90	93.07	4.30	0.86	1.10	0.44	0.18	0.01	34.91	26.39	23.22	6.63	1.42	0.50	0.03					
% Pos 2008	5.62	0.78	10.47	0.95	4.97	0.28	3.02	2.60	0.30	14.48	5.93	26.55	24.89	3.49	0.59	—					
Total 2007	7,090	463	6,590	262	57	83	41	13	3	2,549	1,935	1,476	462	118	50	1					
% Change	-3.07	0.43	-3.35	12.21	3.51	-13.35	-26.83	-7.69	-68.57	-6.28	-6.67	7.66	-1.73	-17.80	-32.00	100.00					

*Other domestic includes: 1 llama. †Other wild includes: 1 bobcat, 2 coyotes; 7 bobcats, 1 coati, 1 cougar, 4 coyotes; 1 coyote, 2 deer; 3 bobcats; 5 bobcats, 2 coyotes; 1 bobcat; 3 bobcats, 3 coyotes, 1 opossum; 1 opossum; 1 coyote, 2 deer; 1 coyote; 1 bobcat, 1 deer; 42 mongooses; 1 opossum; 16 coyotes; 1 opossum; 1 otter; 1 deer. ‡Reptiles and lagomorphs include: 1 groundhog; 1 rabbit; 2 groundhogs; 11 groundhogs; 1 beaver; 5 groundhogs; 4 groundhogs, 1 rabbit; 2 groundhogs; 5 groundhogs; 1 groundhog. §One rabbit animal reported from Delaware without species information.

% Pos = (Total number positive/total number tested) X 100. — = Not calculated.

portional symbols were used to display reported cases by county. All maps were constructed with the Albers equal-area conic projection to minimize areal distortion over the United States.

Rabies in Wild Animals

Wild animals accounted for 6,369 (93.1%) of the 6,841 reported cases of rabies in 2008 (Figure 2). This number represented a 3.4% decrease from the 6,590 cases reported in 2007 (Table 1). Raccoons continued to be the most frequently reported rabid wildlife species (34.9% of all animal cases during 2008), followed by bats (26.4%), skunks (23.2%), foxes (6.6%), and other wild animals, including rodents and lagomorphs (1.9%). Numbers of reported cases in raccoons, bats, and foxes decreased 6.3%, 6.7%, and 1.7%, respectively, compared with 2007 totals. Reported cases in skunks increased 7.7%, compared with 2007. Seasonal trends for wildlife species were similar to previous years, with peaks in reported cases of raccoons, skunks, and foxes in March and May, with a second higher peak among raccoons and skunks in August and September. Reports of rabid bats had a single peak in August.

Raccoons—The 2,389 cases of rabies in raccoons reported in 2008 represented a continued declining trend since the last increase reported in 2006 (Table 1). Overall, the percentage of raccoons with positive test results has also decreased, from 17.7% in 2007 to 14.5% in 2008. Decreases of $\geq 50\%$ in the numbers of rabid raccoons during 2008 were reported by 3 of the 20 eastern states where raccoon rabies is enzootic (ie, Vermont, 60.2% decrease from 2007 [103 cases] to 2008 [41 cases]; Rhode Island, 57.1% decrease from 2007 [21 cases] to 2008 [9 cases]; and Ohio, 54.5% decrease from 2007 [11 cases] to 2008 [5 cases]) and by New York City (77.5% decrease from 2007 [40 cases] to 2008 [9 cases]; Figure 3). Delaware (75.0% increase from 2007 [4 cases] to 2008 [7 cases]) was the only state to report a $\geq 50\%$ increase in the number of rabid raccoons. States in the northeastern and mid-Atlantic focus of the raccoon rabies epizootic accounted for 67.4% (1,611 cases; 13.7% decrease) of the 2,389 total rabies cases in raccoons during 2008. The southeastern states of Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee reported 31.8% (760 cases; 1.6% decrease) of the total cases in raccoons. Excluding Tennessee and Ohio, where skunk rabies is also present, states where raccoon rabies was the only terrestrial rabies virus variant reported 97.9% (2,338/2,389) of all documented cases of rabies in raccoons and accounted for 62.7% (4,292/6,841) of the national total

of rabid animals (76.1% [3,834/5,035] of total cases in terrestrial animals).

Rabid raccoons reported by Texas ($n = 16$), North Dakota (1), and Colorado (1) were presumably the result of spillover infection from local terrestrial reservoirs. Fourteen of the cases in Texas were attributed to the south central skunk rabies virus variant (2 cases were untyped). The case in Colorado was attributed to the south central skunk rabies virus variant. The virus variant in the case in North Dakota was untyped.

Bats—The 1,806 cases of rabies reported in bats during 2008 represented a decrease of 6.7%, compared with the number reported in 2007. Total percentage of tested bats with positive results also decreased from 6.4% in

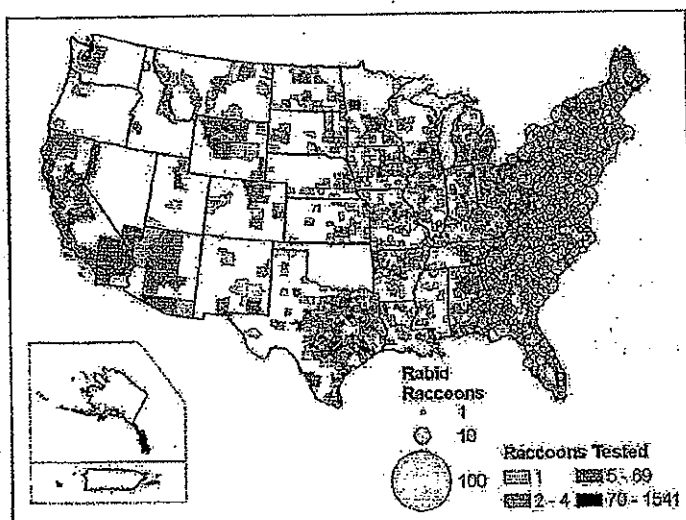


Figure 3—Reported cases of rabies in raccoons, by county, 2008.

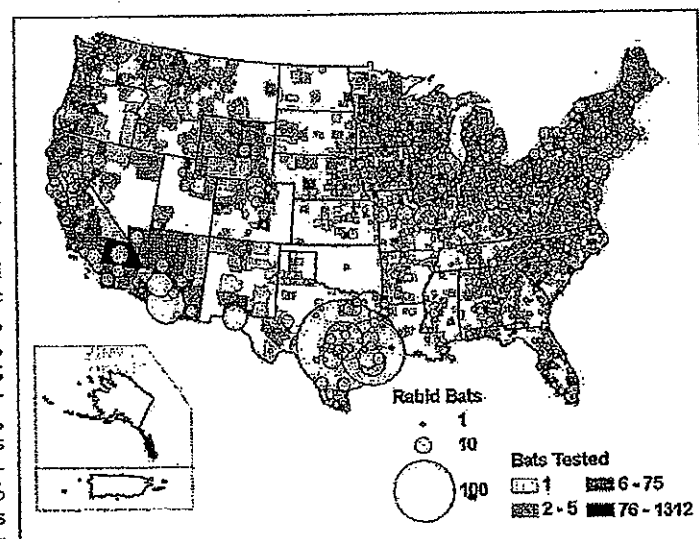


Figure 4—Reported cases of rabies in bats, by county, 2008.

2007 to 6.0% in 2008. Rabies in bats was widely distributed throughout the United States, with cases reported from 47 of the 48 contiguous states (Figure 4). Alaska, Hawaii, New Mexico, and Puerto Rico did not report any cases of bat rabies during 2008. Four states reported > 100 cases of rabies in bats, and these 4 states accounted for nearly half of the reported cases of rabies in bats during 2008 (Texas, 548 cases [30.3%]; California, 137 cases [7.6%]; New York, 112 cases [6.2%]; and Illinois, 103 cases [5.7%]). Nine states (Idaho, Illinois, Indiana, Mississippi, Nevada, Oregon, Utah, Washington, and Wisconsin) reported rabies in bats but not in terrestrial mammals. Of the bats infected with rabies virus, 26.3% (475/1,806) were identified beyond the taxonomic level of order (18 to the level of genus and 457 to the level of species). Among bats identified beyond the taxonomic level of order, 63.8% (303) were the big brown bat (*Eptesicus fuscus*), 10.1% (48) were the Brazilian (Mexican) free-tailed bat (*Tadarida brasiliensis*), 4.4% (21) were the hoary bat (*Lasiurus cinereus*), 4.2% (20) were the red bat (*Lasiurus borealis*), 4.0% (19) were the western pipistrelle (*Pipistrellus hesperus*), 3.4% (16) were the little brown bat (*Myotis lucifugus*), 1.9% (9) were the silver-haired bat (*Lasionycteris noctivagans*), 1.3% (6) were the pallid bat (*Antrozous pallidus*), 0.6% (3) were the long-legged myotis (*Myotis volans*), 0.4% (2) were the California myotis (*Myotis californicus*), 0.4% (2) were the northern long-eared myotis (*Myotis septentrionalis*), 0.4% (2) were the Yuma myotis (*Myotis yumanensis*), 0.4% (2) were the western yellow bat (*Lasiurus xanthinus*), 0.4% (2) were the big free-tailed bat (*Nyctinomops macrotis*), 0.2% (1) was the evening bat (*Nycticeius humeralis*), and 0.2% (1) was the Seminole bat (*Lasiurus seminolus*). Unspecified bats of the genus *Myotis* (18/475) accounted for the remaining rabid bats and contributed 3.8% to the total number of bats identified beyond the taxonomic level of order.

Skunks—The 1,589 reported cases of rabies in skunks (mainly *M. mephitis*) in 2008 represented a 7.7% increase from the number reported in 2007 (Figure 5; Table 1). However, the total percentage of tested skunks with positive results was the same during 2008 (26.6%) as during 2007. Eleven of the 24 states where a skunk rabies virus variant was enzootic reported a $\geq 50\%$ increase in the number of rabid skunks during 2008 (ie, Kentucky, 475% increase from 2007 [4 cases] to 2008 [23 cases]; Colorado, 375% increase from 2007 [4 cases] to 2008 [19 cases]; Arizona, 338% increase from 2007 [13 cases] to 2008 [57 cases]; Wyoming, 300% increase from 2007 [4 cases] to 2008 [16 cases]; New Mexico, 200% increase from 2007 [2 cases] to 2008 [6 cases]; Louisiana, 200% increase from 2007 [1 case] to 2008 [3 cases]; Nebraska, 92% increase from 2007 [13 cases] to 2008 [25 cases]; Arkansas, 70% increase

from 2007 [23 cases] to 2008 [39 cases]; North Dakota, 64% increase from 2007 [11 cases] to 2008 [18 cases]; Minnesota, 56% increase from 2007 [18 cases] to 2008 [28 cases]; and Missouri, 50% increase from 2007 [4 cases] to 2008 [6 cases]). Illinois, Indiana, and Wisconsin reported no rabies in skunks during 2008. Indiana reported a single case of rabies in a skunk in 2007, Illinois has not reported a case of rabies in a skunk since 2005, and Wisconsin has not reported a case of rabies in a skunk since 2006. Montana reported a 67% decrease in the number of rabid skunks from 2007 (6 cases) to 2008 (2 cases).

States in which the raccoon rabies virus variant is enzootic (excluding Tennessee, where skunks are the predominant reservoir) reported 47.1% (749/1,589) of the cases of rabies in skunks, most of which were presumably the result of spillover infection from raccoons. This was a slight

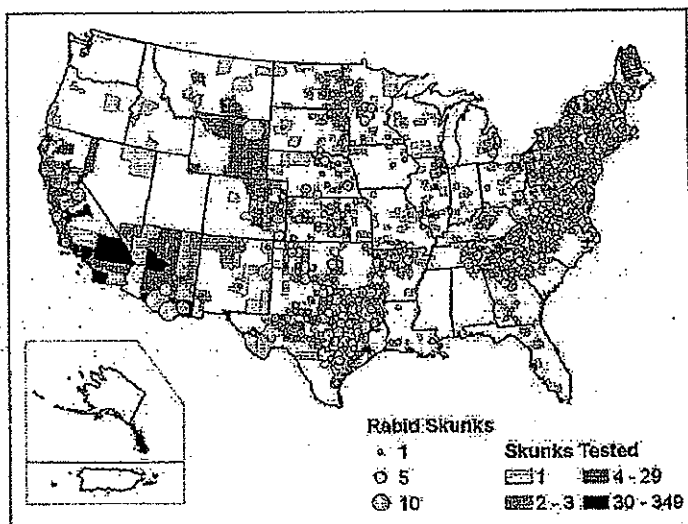


Figure 5—Reported cases of rabies in skunks, by county, 2008.

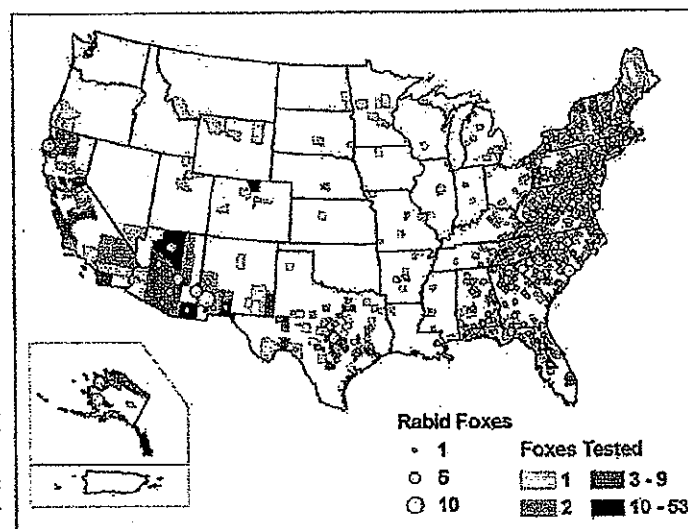


Figure 6—Reported cases of rabies in foxes, by county, 2008.

decrease from the proportion of rabid skunks presumably infected with the raccoon rabies virus variant in previous years. Among the 19 states where the raccoon rabies virus variant is the predominant terrestrial reservoir of rabies, 4 states (South Carolina, 143% increase from 2007 [14 cases] to 2008 [34 cases]; Georgia, 77% increase from 2007 [35 cases] to 2008 [62 cases]; New Jersey, 57% increase from 2007 [28 cases] to 2008 [44 cases]; and West Virginia, 50% increase from 2007 [12 cases] to 2008 [18 cases]) and New York City (133% increase from 2007 [3 cases] to 2008 [7 cases]) reported $\geq 50\%$ increases in the number of rabid skunks. Rhode Island reported more rabid skunks than raccoons for the first time since 2005.

Foxes—Foxes (mainly *A. lagopus*, *U. cinereoargenteus*, or *V. vulpes*) accounted for 6.6% of all cases of rabies in animals reported in 2008 (Table 1). The 454 cases of rabies in foxes represented a 1.7% increase from 2007. The percentage of tested foxes with positive results decreased from 28.4% in 2007 to 24.9% in 2008. Most cases of rabies in foxes (368 [81.0%]) were reported by states affected predominantly by the raccoon rabies virus variant (Figure 6). Ten states (Connecticut, 500% increase from 2007 [1 case] to 2008 [6 cases]; West Virginia, 250% increase from 2007 [2 cases] to 2008 [7 cases]; New Hampshire, 200% increase from 2007 [2 cases] to 2008 [6 cases]; Massachusetts, 167% increase from 2007 [3 cases] to 2008 [8 cases]; Georgia, 100% increase from 2007 [18 cases] to 2008 [36 cases]; Rhode Island, 100% increase from 2007 [2 cases] to 2008 [4 cases]; New Mexico, 78% increase from 2007 [9 cases] to 2008 [16 cases]; and California, 50% increase from 2007 [6 cases] to 2008 [9 cases]) and the District of Columbia (200% increase from 2007 [1 case] to 2008 [3 cases]) reported a $\geq 50\%$ increase in the number of rabid foxes, compared with 2007. Nebraska and Tennessee reported no cases of rabies in foxes during 2007 but reported 1 and 7 cases, respectively, during 2008.

Other wild animals—Puerto Rico reported 42 rabid mongooses (*H. javanicus*) during 2008, a 31% increase from the 32 cases reported in 2007 (Table 1). Other wildlife in which rabies was reported included 31 groundhogs (*Marmota monax*), 22 bobcats (*Lynx rufus*), 20 coyotes (*C. latrans*), 6 white-tail deer (*Odocoileus virginianus*), 4 opossums (*Didelphis virginiana*), 2 rabbits (species not identified), 1 beaver (*Castor canadensis*), 1 coati (*Nasua narica*), 1 cougar (*Puma concolor*), and 1 river otter (*Lontra canadensis*). All cases of rabies in rodents and lagomorphs were reported by states in which rabies is enzootic in raccoons.

For 17 of the 20 coyotes positive for rabies, the variant was typed. Variant information was not reported for cases in Connecticut ($n = 1$) and Georgia (2). All rabid coyotes for which variant typing results were available were infected with the predominant terrestrial rabies

virus variant for the geographic region where the animal was found (4 infected with the Texas gray fox rabies virus variant, 7 infected with the raccoon rabies virus variant, 2 infected with the south central skunk rabies virus variant, and 4 infected with the Arizona gray fox virus variant).

Rabies in Domestic Animals

Domestic species accounted for 6.9% of all rabid animals reported in the United States in 2008 (Table 1). The number of rabid domestic animals reported in 2008 (471) represented a 0.5% increase from the total reported in 2007 (Figure 7). Cases of rabies reported in dogs, horses, and sheep and goats decreased by 19.4%, 26.8%, and 7.7%, respectively, while cases of rabies reported in cats and cattle increased 12.2% and 3.5%, respectively. Pennsylvania reported the largest number of rabid domestic animals (60 cases), followed by Virginia (48), Texas (45), New York (31), Maryland (27), and North

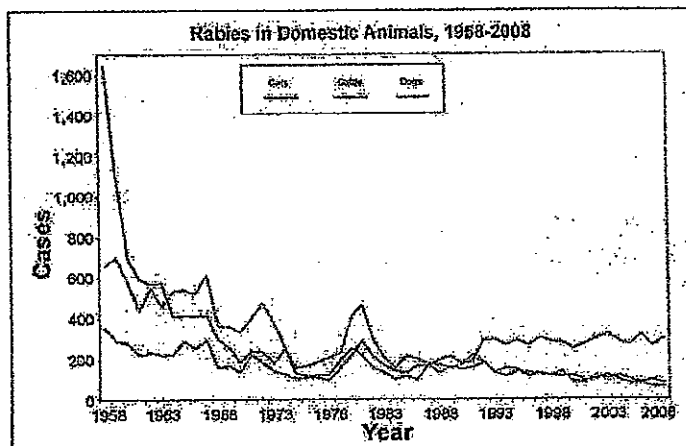


Figure 7—Cases of rabies in domestic animals in the United States, by year, 1958 to 2008.

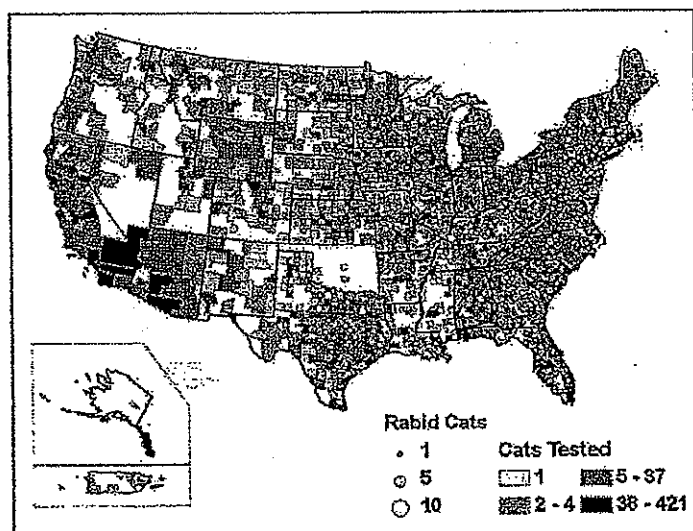


Figure 8—Reported cases of rabies in cats, by county and municipio (Puerto Rico), 2008.

Carolina (25). Seasonal distribution for reporting of rabies in domestic animals was similar to that for previous years. Reported cases of rabies in cats had a slight peak during June and July. Reported cases of rabies in cattle and dogs do not show any strong seasonal patterns.

Cats—The number of cases of rabies reported in cats was nearly 4 times the number reported for dogs and 5 times the number reported for cattle. Most (82.3%) of the 294 cases of rabies in cats were reported from states in which the raccoon rabies virus variant was present (Figure 8). Remaining cases were reported principally by Central Plains states, where most cases were presumably the result of spillover from rabid skunks. Eleven states reported > 10 cases of rabies in cats (Pennsylvania, 53 cases; Virginia, 34; New York, 23; Maryland, 21; North Carolina, 18; Texas, 15; Georgia, 15; Massachusetts, 15; New Jersey, 15; Kansas, 11; and Connecticut, 11). Twenty-one states did not report any rabid cats.

Dogs—Texas (15 cases), Puerto Rico (11), Georgia (6), and Kentucky (6) reported the largest numbers of cases of rabies in dogs (Figure 9). No other state reported > 5 cases of rabies in dogs in 2008. No cases were reported involving the dog/coyote rabies virus variant last identified in Texas in 2004. Twenty-eight states, the District of Columbia, and New York City did not report any rabid dogs.

Excluding rabid dogs from Puerto Rico, which are presumably infected with the mongoose rabies virus variant, 64 cases of rabies in dogs were reported from the United States. For 43 of these 64 (67%) cases, the variant was reportedly typed through the use of monoclonal antibodies or sequenced to determine the rabies virus variant. By comparison, the virus variant was typed in 58% of cases involving rabid dogs reported from the continental United States during 2007. One dog imported from Iraq to New Jersey was found to be infected with a canine rabies virus variant. Rabies virus variants isolated from all other rabid dogs that were typed in 2008 were reported as the terrestrial rabies virus variant associated with the geographic area where the dog was collected (Figure 1). Typing results were not reported from Arkansas (variant not typed for 3 of 4 rabid dogs), Georgia (2 of 6), Iowa (1 of 1), Kentucky (6 of 6), Massachusetts (1 of 1), North Dakota (4 of 4), New Jersey (1 of 2), and Pennsylvania (3 of 3).

Other domestic animals—The number of cases of rabies in cattle increased 3.5% from 57 in 2007 to 59 in 2008 (Figure 10; Table 1). Texas (9 cases), New York (6), Oklahoma (6), and Virginia (6) reported the largest numbers of rabid cattle. No other state reported > 5 cases of rabies in cattle in 2008. The 30 cases of ra-

bies reported in horses and mules (including donkeys) in 2008 represented a 26.8% decrease from the 41 cases reported in 2007. Reported cases of rabies in sheep and goats decreased 7.7% from 13 cases in 2007 to 12 cases in 2008. A rabid llama was reported from Georgia.

Rabies in Humans

Two cases of rabies in humans were reported in the United States in 2008 (Table 2). In March 2008, a newly arrived immigrant from Mexico presented to a hospital in Santa Barbara, Calif, with encephalitic symptoms and died shortly thereafter. Rabies was suspected on the basis of the individual's clinical signs and reports of domestic and wild animal exposures acquired in Oaxaca,

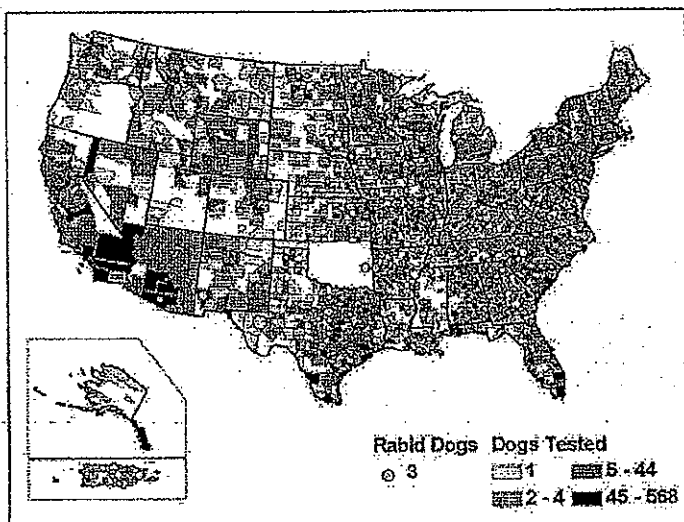


Figure 9—Reported cases of rabies in dogs, by county and municipio (Puerto Rico), 2008.

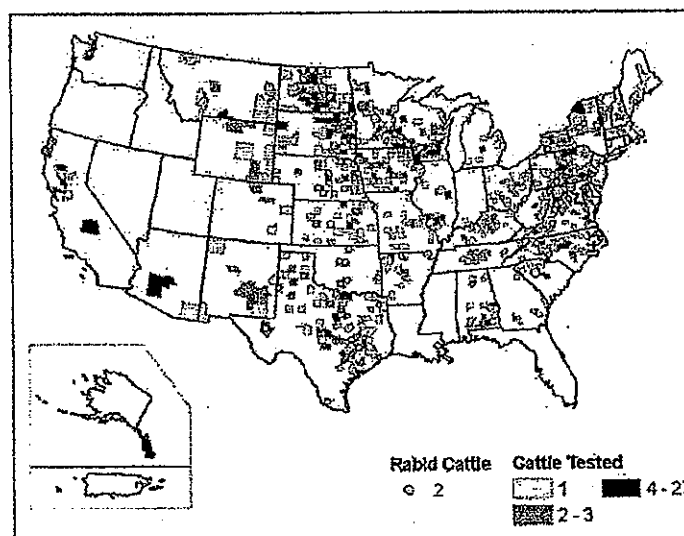


Figure 10—Reported cases of rabies in cattle, by county and municipio (Puerto Rico), 2008.

Table 2—Cases of rabies in humans in the United States and Puerto Rico, 2000 through 2008, by circumstances of exposure and rabies virus variant.

Date of death	State of residence	Exposure history*	Rabies virus variant†
20 Sep 00	CA	Unknown‡	Bat, Tb
9 Oct 00	NY	Bite-Ghana	Dog, Africa
10 Oct 00	GA	Unknown‡	Bat, Tb
25 Oct 00	MN	Bite	Bat, Ln/Ps
1 Nov 00	WI	Unknown‡	Bat, Ln/Ps
4 Feb 01	CA	Unknown‡-Philippines	Dog, Philippines
31 Mar 02	CA	Unknown‡	Bat, Tb
31 Aug 02	TN	Unknown‡	Bat, Ln/Ps
28 Sep 02	IA	Unknown‡	Bat, Ln/Ps
10 Mar 03	VA	Unknown‡	Raccoon, eastern United States
5 Jun 03	PR	Bite	Dog/mongoose, Puerto Rico
14 Sep 03	CA	Bite	Bat, Ln/Ps
15 Feb 04	FL	Bite	Dog, Haiti
3 May 04	AR	Bite (organ donor)	Bat, Tb
7 Jun 04	OK	Liver transplant recipient	Bat, Tb
9 Jun 04	TX	Kidney transplant recipient	Bat, Tb
10 Jun 04	TX	Arterial transplant recipient	Bat, Tb
21 Jun 04	TX	Kidney transplant recipient	Bat, Tb
Survived 04	WI	Bite	Bat, unknown
26 Oct 04	CA	Unknown‡	Dog, El Salvador
27 Sep 05	MS	Unknown‡	Bat, unknown
12 May 06	TX	Unknown‡	Bat, Tb
2 Nov 06	IN	Bite	Bat, Ln/Ps
14 Dec 06	CA	Bite	Dog, Philippines
20 Oct 07	MN	Bite	Bat, unknown
18 Mar 08	CA	Bite-Mexico	Bat, Tb related
30 Nov 08	MO	Bite	Bat, Ln/Ps

*Data for exposure history are reported only when the biting animal was available and tested positive for rabies, when plausible information was reported directly by the patient (if lucid or credible), or when a reliable account of an incident consistent with rabies exposure (eg, dog bite) was reported by an independent witness (usually a family member). †Variants of the rabies virus associated with terrestrial animals in the United States and Puerto Rico are identified with the names of the reservoir animal (eg, dog or raccoon), followed by the name of the most definitive geographic entity (usually the country) from which the variant has been identified. Variants of the rabies virus associated with bats are identified with the names of the species of bats in which they have been found to be circulating. Because information regarding the location of the exposure and the identity of the exposing animal is almost always retrospective and much information is frequently unavailable, the location of the exposure and the identity of the animal responsible for the infection are often limited to deduction. ‡In some instances in which the exposure history is unknown, there may have been known or inferred interaction that, especially for bats, could have involved an unrecognized bite.

Ln/Ps = *Lasionycteris trochiloides* or *Pipistrellus subflavus*, the silver-haired bat or the eastern pipistrelle. Tb = *Tadarida brasiliensis*, the Brazilian (Mexican) free-tailed bat.

Mexico. At autopsy, samples were submitted for rabies diagnosis, and results of a direct fluorescent antibody test performed by the California Department of Health Services were positive. Further testing by the CDC identified a novel rabies virus variant that phylogenetic analysis indicated was most closely related to rabies virus variants associated with free-tailed bats.²⁸

On November 24, 2008, the CDC was contacted by the Missouri Department of Health and Senior Services regarding a potential case of human rabies. The patient was a 55-year-old male who had first presented to a hospital in southeastern Missouri on November 18 with chest and back pain. Clinical signs progressed to left arm paresthesia, dysphagia, erratic behavior, and hydrophobia. Rabies was suspected after the patient and family members related that approximately 4 to 6 weeks before the onset of clinical signs, the patient had

been bitten on the ear by a bat. The patient had not sought rabies prophylaxis because the bat did not appear sick. On November 25, samples were submitted to the CDC and a diagnosis of rabies was confirmed. The virus was characterized as a rabies virus variant associated with silver-haired (*L. noctivagans*) and eastern pipistrelle (*Pipistrellus subflavus*) bats. The patient died November 30 after 12 days of hospitalization.

During 2008, samples from 45 human patients in the United States were submitted to the CDC for rabies testing, representing a 24% decrease from the 59 samples tested during 2007. Primarily, prevention of human rabies consists of health communications to inform the public about proper behavior to decrease the likelihood of exposure, animal vaccination, and application of appropriate and timely postexposure prophylaxis in exposed humans.

Rabies in Canada and Mexico

Canada reported 235 laboratory-confirmed cases of rabies in domestic and wild animals in 2008. This was a decrease of 13.9% from the 273 cases reported in 2007 and was the seventh time in the past 8 years that there had been a decrease in the number of reported rabies cases. Eighty-seven percent ($n = 204$) of reported cases involved wild animals, 6.8% (16) involved livestock, and 6.4% (15) involved domestic companion animal species. There was also a decrease of 369 in the total number of diagnostic specimens tested in 2008, compared with 2007. The total number of diagnostic specimens tested has remained relatively stable over the 8-year period from 2001 through 2008 (mean, 7,962 samples tested/y). The number of rabid raccoons decreased by 54% (59 to 27), and rabid raccoons accounted for 11.5% of all rabid animals in 2008. Reported cases in bats and cattle decreased by 34% (93 to 61) and 20% (15 to 12), respectively. Increases occurred mainly in skunks, dogs, and foxes. Skunk cases increased by 27% (78 to 99), accounting for 42.1% of all rabies cases. Reported cases in dogs and foxes increased by 71% (7 to 12) and 15% (13 to 15), respectively. Some regional distribution of rabid wild species (eg, bats in British Columbia; skunks in Manitoba; foxes, skunks, and raccoons in Ontario; and raccoons in Quebec) was evident in Canada. No human cases of rabies were reported in Canada in 2008.

Mexico reported 232 cases of animal rabies in domestic and wild animals during 2008. This represented a 19.4% decrease from the number of cases (288) reported during 2007. Thirteen percent (31/232) of rabies cases involved dogs. Other domestic animals reported included cattle (183 [78.9% of all animals reported]) and other livestock (16 [6.9%]). Two cases of rabies were reported in wildlife species. Three cases of rabies in humans were reported during 2008; all were attributed to exposure to a vampire bat.

Discussion

Passive surveillance for rabies relies largely on interactions between humans and animal reservoirs and subsequent possible exposure of people to the rabies virus. Importantly, reporting of cases at an aggregate political boundary (ie, counties) complicates the ability to detect and analyze detailed relationships between environmental variables and the spread of zoonotic diseases such as rabies. Enhanced surveillance carried out by several state health departments and the USDA Wildlife Services augments passive public health surveillance in critical geographic areas, such as those areas ahead of epizootic fronts.

Although raccoons continued to account for the highest percentage (34.9%) of rabies cases reported among animals in the United States in 2008, the magnitude of this ratio has decreased consistently since 2004. Enzootic transmission of rabies among raccoons and from rabid raccoons to other species continued in 20 states, New York City, and the District of Columbia in 2008. The proportion of animal rabies cases geographically associated with the raccoon rabies virus variant reflected the high public health burden of this variant,

compared with other terrestrial variants in the United States. Moreover, the human exposure risk to this variant is substantial, as reflected in cross-sectional studies of human postexposure prophylaxis.^{29,30}

Rabid bats were reported from 47 of the 48 contiguous states during 2008. The epizootiology and phylogenetics of rabies in bats is distinct from the epizootiology and phylogenetics of terrestrial rabies maintained by mammalian carnivores. Knowledge regarding the circulation of rabies virus variants in bat species remains less developed than knowledge of variants found in carnivores. Bat-associated rabies virus variants account for most human infections in the United States in recent years. This trend has been highly publicized and resulted in public health recommendations for potential rabies exposures involving bats.^{31,32} Increased publicity and awareness of bats and rabies have increased the rate of submission of bats for diagnostic testing following potential exposure. Since 1996, when the public health recommendations began to include more conservative guidelines regarding rabies exposure involving bats, the number of bats submitted for rabies testing has increased from approximately 10,000 to > 30,000 in 2008. Bats are submitted for testing at a rate that is comparable to that for cats and dogs, exceeding the submission rate of any other wildlife species.

Reports of rabid skunks increased in 2008. Given the results of antigenic typing of the virus from a subsample of rabid skunks from areas where raccoon rabies is enzootic, most rabid skunks in these states are presumed to be infected with the raccoon rabies virus variant. To date, studies have been unable to demonstrate evidence of unique adaptation, circulation, or maintenance of the raccoon rabies virus variant in skunks.³³ Approximately half of all reported skunks are infected with one of the skunk rabies virus variants. When skunks presumably infected with the raccoon rabies virus variant on the basis of geographic location were excluded, a dramatic decrease in the number of reported cases of rabies in skunks attributable to a skunk variant was observed.

In the southwest, Arizona reported an increase in the number of rabid skunks ($n = 57$). During 2001, a new focus of rabies in skunks related to a big brown bat rabies virus variant in the Flagstaff area of northern Arizona was recognized as having sustained transmission among skunks.^{34,35} In response to this new variant, Arizona responded with trap, vaccinate, and release programs targeted at skunks as well as a field trial with a vaccinia-rabies glycoprotein recombinant vaccine to orally vaccinate skunks. Following 2 years of no reported cases involving this variant, a resurgence occurred during 2008. Responses similar to prior years are ongoing to try to control the spread of this novel variant.

The red fox rabies virus variant has not been detected in the northern United States in an excess of 5 years, most likely because of control measures (eg, oral vaccination programs) in place in Canada and the northern United States. Rabies in gray foxes in Arizona and Texas is typically the result of infection with gray fox variants found in each of those states. Oral vaccination of gray foxes in west and central Texas has been responsible for reducing the distribution of the Texas gray fox rabies vi-

rus variant. However, this oral vaccination program was challenged during 2008 as increased spillover into coyotes was observed, and cases were identified northward along the Pecos River outside the existing baiting zone. Additional baiting in these areas was initiated to provide extended coverage.

Throughout the western hemisphere, small mammals have never been implicated as potential reservoir species. Rabies among rodents and lagomorphs reflects spillover infection from regional terrestrial reservoir species. Among rodents, rabies occurs primarily in groundhogs (31 cases reported in 2008) in areas of the country affected by the raccoon rabies virus variant.³⁶ Rabies is occasionally reported in other large-bodied members of this order, such as beavers (1 case in 2008). Large-bodied wild rodents and captive rabbits in outdoor cages or pens may become infected and survive long enough to pose a risk to other species, such as humans.³⁷ Rabies is seldom reported in smaller rodents, presumably because of the high likelihood of death or severe trauma in small rodents attacked by rabid carnivores. There has been no documentation of rabies virus transmission from a rodent or lagomorph to a human.

Despite the threat of rabies transmission from wild terrestrial carnivores, the use of population-reduction programs to control rabies among such animals is not desirable. Use of an oral vaccination program in Switzerland during the past 30 years resulted in a declaration of rabies-free status for that country in 1998, and similar strategies led to rabies-free status being declared in France in 2000 and in Germany in 2008.^{38,39} The elimination of a rabies virus variant associated with red foxes in southern Ontario also supports the hypothesis that rabies virus variants associated with foxes can be eliminated through oral vaccination programs.⁴⁰

In the United States, oral rabies vaccination programs may have restricted the expansion of raccoon rabies. Programs involving distribution of the vaccinia-rabies glycoprotein recombinant vaccine in baits to prevent or slow the geographic expansion of rabies in wild raccoons continue in a number of states and are being expanded. During 2008, multiple state agencies, USDA Wildlife Services, and the CDC continued to cooperate in a massive undertaking to maintain and expand an "immune barrier" beginning in Ohio, Pennsylvania, and New York and intended to reach the Gulf of Mexico in Alabama in an attempt to curtail the spread of raccoon rabies. In Ohio, Pennsylvania, Maryland, West Virginia, Virginia, North Carolina, and northeastern Tennessee (otherwise known as the Appalachian Ridge oral rabies vaccination zone), approximately 5 million doses of vaccinia-rabies glycoprotein recombinant vaccine-laden baits were distributed. In addition, approximately 1 million doses of oral vaccine were distributed in Georgia, Alabama, and Tennessee (the GAT oral rabies vaccination zone).⁴¹ Approximately 3 million baits were distributed in Texas in an attempt to contain and eliminate the gray fox rabies virus variant and prevent the reintroduction of canine rabies virus variants associated with coyotes and dogs from Mexico during 2008.⁸⁻¹⁰ Enhanced surveillance conducted by USDA Wildlife Services and routine surveillance by state public health agencies continue to determine the placement of new oral rabies vac-

cination zones as well as the shape of baiting zones each year. Translocation of infected animals, as has occurred in the past, continues to pose a substantial threat to the goals of national oral rabies vaccination programs.^{3,12} Concerns regarding vaccine safety and efficacy, ecologic impact, and physical bait variables, which were raised during earlier trials, continue to be assessed.^{17,18,42-46} Development of novel biologics is ongoing to overcome the limited efficacy of the vaccinia-rabies glycoprotein recombinant vaccine in certain animal species (eg, skunks and mongooses).⁴⁷⁻⁵⁰

Despite little change in the total number of overall reported rabies cases in domestic animals, a 19.4% decrease in the reported cases of rabies in dogs occurred from 2007 to 2008. Cases of rabies in cats and dogs are primarily attributable to spillover from local terrestrial reservoirs,⁵¹ and the United States has been free from dog-to-dog transmission of rabies since 2004.^{52,53} However, continued surveillance will be required for early detection and to prevent this rabies virus variant or others from being reintroduced into the United States. The potential for reintroduction has been demonstrated in recent years. Following the importation of a rabid puppy from India in 2007, a rabid dog was imported from Iraq into New Jersey during 2008.⁵⁴ Since 2004, at least 4 cases of rabies in recently imported dogs have been reported. The risk of importation of rabies and other exotic zoonotic diseases may be increasing as more animals are brought into the United States each year.⁵⁵

Since 1992, cats have remained the leading domestic animal species with rabies reported each year.⁵⁶ Several studies^{29,30} have indicated that cats are a leading domestic animal source of possible human exposure to rabies requiring postexposure prophylaxis. Further reduction in the number of rabies cases in companion species, especially cats, may require stricter observance and enforcement of vaccination and supervision. Vaccination remains a crucial element in this effort. However, not all states currently have laws requiring vaccination of cats against rabies.

Rabies vaccination of pet mammals and livestock that have regular contact with people is a fundamental barrier to human exposure. A single incident involving a case of rabies in a companion animal species can result in large economic expenditures and public health efforts to ensure that human disease does not occur.³⁷⁻³⁹ Although widespread vaccination of livestock is neither economically feasible nor justifiable on public health grounds, vaccination of valuable livestock or livestock that may have regular contact with human beings (eg, animals in petting zoos) in rabies epizootic areas should be considered.^{60,61}

Twenty-eight cases of human rabies have been reported in the United States since 1998, including the 2 cases reported in 2008. Seven of these 28 (25%) individuals were infected outside the continental United States (6 abroad and 1 in Puerto Rico). Most human rabies infections that occur in foreign countries where dog rabies is enzootic involve regional canine rabies virus variants, with the exception of the 2008 case from Mexico, which was associated with wildlife species. Twenty-one of the 28 (75%) individuals were infected with rabies virus variants indigenous to the United States. Analysis of monoclonal antibodies and

genetic sequencing data indicated that 17 of these 21 (81%) persons were infected with bat rabies virus variants. Epidemiologic investigations in 3 additional cases implicated a bat as the most likely source of exposure. In 1 case, the virus was typed as a rabies virus variant associated with raccoons. In 13 of the 20 (65%) human rabies cases associated with bats since 1998, there has been a report of a bite or direct contact with a bat (eg, awaking to find a bat on the body or picking up a grounded bat). Four (20%) cases were associated with organ transplants or an arterial graft from a rabies-infected donor.^{4,22} Three patients with bat-associated rabies were reported to have no known exposure to a bat. In these instances, the most likely route of infection with rabies virus was a bite that was ignored or went unnoticed during an interaction with a bat. Although rabies infection of humans following exposure to bats remains a rare occurrence, the prevention of such infections remains an important public health concern.

Rabies should be included in the differential diagnosis for any patient with unexplained, acute, rapidly progressive encephalitis, especially in the presence of autonomic instability, dysphagia, hydrophobia, paresis, or parasthesia.⁶² Given the report⁶³ of survival of a rabies patient after experimental treatment in 2004, early diagnosis of potential rabies cases has become increasingly important, particularly if experimental treatment is to be considered. However, the benefits of any particular experimental rabies treatment regimen have not been determined. No single course of treatment for rabies in humans has been documented to be efficacious after clinical signs of rabies are present.

New Advisory Committee on Immunization Practices recommendations on human rabies prevention were issued in May 2008, in addition to an update of the national rabies compendium.^{31,60} The committee's recommendations were updated to provide an evidence-based approach to current recommendations for rabies preexposure vaccination and postexposure prophylaxis, providing a review of current knowledge on human rabies vaccines, rabies immune globulin, prophylaxis series, and adverse events. Overall recommendations regarding postexposure prophylaxis did not change from the 1999 recommendations.

During 2008, ongoing rabies vaccine supply issues reinforced the need to emphasize basic human rabies prevention and prophylaxis recommendations as well as animal rabies control. Circumstances initiated in late 2007 led to limitations in the available supply of both of the commercially licensed human vaccines in the United States. A national working group of subject matter experts, consisting of state and federal health officials, experts from academia, and representatives from relevant professional organizations, was convened to provide guidance and recommendations in response to the limited rabies vaccine supply and in the event of a true shortage (defined as the point at which vaccine would not be projected to be available for persons with rabies exposure). Throughout most of 2008, rabies vaccine was restricted to use for postexposure prophylaxis only, except for use in critical first responders (eg, rabies diagnosticians) by approval of state and federal public health officials. To prevent a shortage, close consultation with local and state

health departments was recommended before initiation of postexposure prophylaxis after a potential exposure. This extensive public health response prevented a true shortage of rabies vaccine throughout the summer during peak rabies season, and supplies improved toward the end of 2008 and into 2009. The national working group continues to evaluate recommendations for rabies postexposure prophylaxis in the event of a shortage, improvements to human rabies postexposure prophylaxis surveillance, and national stockpile options.

2009 Rabies Update

A preliminary analysis of data from states submitting monthly data to the CDC for the first 4 months of 2009 showed a decrease in the number of cases of rabies, compared with the same time period during 2008. One case of human rabies was reported from Texas during the first 5 months of 2009. In March 2009, a 17-year-old female presented to a hospital in Houston with a history of headaches, photophobia, and left-sided weakness. The condition worsened over the next several days, and the patient was hospitalized with acute neurologic abnormalities and aggressiveness. Results of all routine tests for suspected conditions were negative. The patient had no history of foreign travel. During follow-up, the patient reported a visit to a Texas cave where she had had direct contact with bats but no reported bite. Samples were submitted to the CDC to rule out rabies. Antibodies to rabies virus were detected in the patient's CSF, but no viral amplicons were detected in saliva or in a nuchal biopsy specimen. The patient's condition improved gradually, and she was discharged without incident.

Rabies vaccine supplies showed improvement over the limitation observed in 2008. One vaccine, RabAvert, remained available for both pre- and postexposure prophylaxis, whereas the vaccine Imovax was available only for postexposure prophylaxis following consultation with a state health department. Published evidence regarding the necessity of the fifth dose of vaccine in patients undergoing rabies postexposure prophylaxis was prepared for review by the Advisory Committee on Immunization Practices. At its June 24, 2009, meeting, the committee's rabies working group presented evidence in support of a recommendation to reduce the number of vaccine doses in the human rabies postexposure prophylaxis series from 5 to 4 doses. After much discussion, the committee voted in favor of accepting the recommendation. This will effectively change the 2008 Advisory Committee on Immunization Practices' recommendations for human rabies prevention as follows: the postexposure prophylaxis protocol will consist of administration of human rabies immune globulin (20 U/kg) on day 0 and administration of 4 doses of vaccine (1 mL, IM) on days 0, 3, 7, and 14. Formal publication of the recommendations will be forthcoming.

- a. SIEPI Epidemiological Information System [database online]. Washington, DC: Pan American Health Organization, Pan American Center for Foot-and-Mouth Disease, 2008. Available at: siepi.panaftosa.org.br/Export.aspx. Accessed Jul 15, 2009.
- b. ArcMap, version 8.3, ESRI, Redlands, Calif.

Parvovirus Outbreak in Raccoons (*Procyon lotor*) being Rehabilitated at Wildcat Wildlife Center

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Abstract: Parvovirus infection in raccoons (*Procyon lotor*) is a potentially devastating disease for rehabilitation centers that work with large numbers of raccoons annually. Raccoons are reportedly affected by three related parvoviruses including raccoon parvovirus, feline parvovirus (panleukopenia or feline distemper), and mink parvovirus (mink enteritis virus). The disease primarily affects young raccoons and is characterized by depression, bloody diarrhea, and sudden death. The importance of parvoviral infections in free-ranging raccoons is not known but is potentially a substantial source of mortality. During July and August of 2007, a parvovirus outbreak killed 26 of 98 raccoons being rehabilitated at the Wildcat Wildlife Center (WWC) in Delphi, Indiana. The raccoons presented with lethargy, anorexia, diarrhea, and loss of motor skills. Euthanasia was necessary for several of the severely affected animals. Two animals were submitted to the Animal Disease Diagnostic Laboratory in West Lafayette, Indiana, where veterinary pathologists reported myeloid hypoplasia and histopathologic lesions consistent with parvoviral enteritis, although no parvoviral particles were detected with virus isolation. Acutely affected raccoons found alive were isolated and given antibiotics and supportive care with little success. One recovered and likely will be suitable for release. The other 71 raccoons were successfully released. At the time of the outbreak, all but three of the rehabilitating raccoons were fully vaccinated for recommended canine and feline diseases, including parvovirus.

Keywords: Raccoon, *Procyon lotor*, parvovirus, wildlife, vaccination

INTRODUCTION

Raccoons are susceptible to three antigenically similar but unique parvoviruses including raccoon parvovirus, panleukopenia (feline parvovirus, feline distemper), and mink parvovirus (Barker et al 1983; Doster 2006; Shenoy 2007). They are not affected by canine parvovirus (Barker et al 1983; Raymond 1997). Parvovirus tends to have the greatest effect on young or immunocompromised animals (Martin and Zeidner 1992; Shenoy 2007). Affected raccoons present with

weakness, diarrhea, dehydration, and depression with rapid deterioration (Davidson 1997). They may have a loss of fear of humans (Raymond 1997). The importance of parvoviral infections in free-ranging raccoons is not known, but is potentially a substantial source of mortality (Davidson 1997). There have been reports of severe disease in free-ranging raccoons with parvovirus infection, but the presence of concurrent infections such as cryptosporidiosis and coronavirus makes it difficult for a definitive conclusion to be made about the role each agent plays in disease (Martin and Zeidner 1992). In captive settings such as rehabilitation facilities, where large numbers of young raccoons are housed together or in close proximity, parvovirus infection may be a more serious threat. The Southeastern Cooperative Wildlife Disease Study reported that since 1976, 12 out of 655 examined raccoons tested positive for parvovirus and 92 percent of those had a history of captivity (Doster 2006). Although the history of these raccoons and why they were tested is not completely clear, it appears that time in captivity is a risk factor for parvovirus in raccoons.

SUMMARY OF PARVOVIRUS OUTBREAK

Between 11 July and 12 August 2007, a parvovirus outbreak killed 26 raccoons being rehabilitated at WWC in Indiana. A total of 98 raccoons ranging from three to six months of age were being housed at the time of the outbreak. There are four separate raccoon areas at WWC where animals are housed, with groups of two to seven housed in wire pens and larger groups (7 to 21) in two corn cribs modified for raccoon caging. Direct contact between the rehabilitating raccoons and other free roaming wildlife such as raccoons and mink, as well as domestic feral cats is possible through the fencing. At the time of the outbreak,

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all but three of the rehabilitating raccoons were fully vaccinated for recommended canine and feline diseases including parvovirus. Vaccinations begin when raccoons are about three weeks old with the Duramune Max 5-CvK[®] (Fort Dodge, Overland Park, KS) vaccine without leptospira followed by a Duramune 5-CvK/4L[®] (Fort Dodge, Overland Park, KS) booster every three weeks for at least three sets. These vaccines are used to protect against canine distemper and leptospirosis. Fel-O-Vax IV[®] (Fort Dodge, Overland Park, KS) plus Calicivax[®] vaccines (Fort Dodge, Overland Park, KS) are given on alternate weeks relative to the canine vaccine. This vaccine is used to protect against feline and raccoon parvovirus. Due to difficulty finding a supplier and shipping delays, a mink parvovirus enteritis vaccine was not available until after this outbreak had largely subsided. The Biovac vaccine by United Vaccines Co. (Madison, WI) is now included in raccoon vaccination protocols at WWC.

Symptoms and Treatment. The 27 clinically affected raccoons presented with lethargy, anorexia, green to olive diarrhea, oculonasal discharge, loss of motor skills, or sudden death. Two raccoons exhibited black, tarry stool approximately 24 hours before they died. Sick raccoons were immediately isolated indoors and given amoxicillin/clavulanic acid (Clavamox[®], Pfizer Animal Health, New York, NY), sulfadimethoxine (Albon[®], Pfizer, New York, NY) and subcutaneous fluids (Normosol-R[®], Johnson & Johnson Medical, Division of Ethicon, Inc., Arlington, TX). One animal recovered, but the other 26 continued to deteriorate and later died. Euthanasia was necessary for six severely affected animals. More drastic measures, such as continuous intravenous fluid support, likely would have been more effective but were not practical. There are no reports in the literature describing effective treatment of advanced parvoviral enteritis in raccoons. In kittens, intensive parenteral fluid and antibiotic therapies reduce mortality (Green and Addie 2006).

Two of the euthanized raccoons were submitted to the Animal Disease Diagnostic Laboratory in West Lafayette, Indiana where veterinary pathologists reported myeloid hypoplasia and histopathologic lesions consistent with parvoviral enteritis, although no parvoviral particles were detected with virus isolation. Other findings included intestinal coccidiosis and positive *Salmonella* sp. culture. The significance of concurrent coccidiosis and salmonellosis in the examined raccoons is unclear. Both are reported in raccoons and both may have contributed to the clinical disease and death of the animals. Neither was likely the primary cause of death. Coccidiosis is more commonly a

subclinical finding but severe disease can occur secondarily in immunocompromised domestic carnivores (Dubey and Greene 2006). Salmonellosis is usually associated with mild to moderate gastroenteritis but can cause severe septicemias secondary to immunosuppression (Ketz-Riley 2003). The raccoons may have become infected secondarily after being immunocompromised by parvovirus. Concurrent infections seem to be a frequent finding in wildlife with clinical disease. Martin and Zeidner (1992) reported a similar situation in which a raccoon diagnosed with parvoviral enteritis had concurrent cryptosporidiosis and coronavirus infection.

Biosecurity Measures. After the outbreak began, WWC staff immediately placed bleach water footbaths at entrances to the hospital, isolation rooms, and other key locations. Footbaths were changed at least twice per day. Volunteers were assigned different raccoon areas and instructed to avoid walking between areas. After completing their area, volunteers either showered and changed clothes, or left the facility. Anyone who worked with the raccoons was not allowed to care for other mammals that day. All tools, including buckets, nest boxes, enrichment items, wheelbarrows, pool liners, and food dishes were dedicated to one area and scrubbed with soapy bleach water, rinsed, and dried after each use. Parvovirus is hardy in the environment but can be killed by certain disinfectants including sodium hypochlorite (bleach) and glutaraldehyde (Gaskell and Dawson 2005). Virkon S[®] (Global International Inc., St. Louis, MO) and Trifectant[®] (Vetoquinol USA Inc., Buena, NJ) disinfectants are also good choices for parvovirus; the primary agent in these disinfectants is potassium peroxymonosulfate.

CONCLUSION

The outbreak at WWC raises major concerns regarding the management of parvovirus and other infectious disease outbreaks in the wildlife rehabilitation setting. It is obvious that once clinical disease becomes apparent, it is almost always too late to manage the outbreak medically without significant mortalities. This is especially true in the wildlife rehabilitation setting where the majority of patients are weak orphans or trauma patients that simply cannot handle any additional stress or illness. Preventative measures might include double fenced outdoor enclosures, and sanitation/disinfection of pens, water bowls, enrichment items, and other objects that may act as fomites. Young or healthy animals should always be cared for before older or sick animals to reduce the spread of

disease to susceptible animals. Ideally, these measures should be ongoing at all times. The feasibility and practicality of many of these measures, however, is often questionable in the rehabilitation environment due to lack of money, space, or staff. In addition, outdoor enclosures on natural substrates are notoriously difficult to disinfect. Careful attention to these easily ignored matters can significantly reduce the impact of an infectious disease outbreak. The measures taken by WWC early in the course of the outbreak likely limited the spread of parvovirus and minimized mortality to 26 of 98 at risk animals.

This outbreak represents the first significant raccoon loss since vaccination protocols were initiated at WWC and raises major concerns about vaccine efficacy. The efficacy of vaccines designed for domestic animals and used in wildlife has not been well studied. Protocols are often based on clinical experience or by extrapolating data from studies on domestic animals (Shenoy 2007). This can make interpretation of the efficacy of vaccine protocols in the wildlife rehabilitation setting difficult to determine or improve. In this case, all but three of the affected raccoons were fully vaccinated with recommended parvovirus vaccines. There are many possible reasons why the vaccinated raccoons may not have been adequately protected. They may have been too stressed from recent weaning and moving from indoors to outdoors to mount an adequate immune response to the vaccine antigens. Dog and cat vaccines may not provide adequate cross protection against raccoon or mink parvovirus, or there simply could have been a bad batch of vaccine or an undetected problem with vaccine storage. It may be that the sick raccoons had not had sufficient time to mount a suitable response prior to exposure to parvovirus in the environment. This occurs when inactivated vaccines are used in exposed kittens (Greene and Addie 2006). Early and prolonged vaccination schedules are recommended for at risk kittens (Greene and Addie 2006). Additional research and collaboration between rehabilitators and wildlife veterinarians is needed. At WWC, it will be important to continue monitoring outbreaks and their severity over the next few years to determine the source of the parvovirus, evaluate vaccine efficacy, implement practical preventative measures, and expose possible internal oversights that may be spreading virus between pens.

LITERATURE CITED

- Barker, I. K., R. C. Povey, and D. R. Voigt. 1983. Response of mink, skunk, red fox and raccoon to inoculation with mink virus enteritis, feline panleukopenia and canine parvovirus and prevalence of antibody to parvovirus in wild carnivores in Ontario. *Canadian Journal of Comparative Medicine*. 47:188-197.
- Davidson, W. 1997. *Field Manual of Wildlife Diseases of the Southeastern United States*. Southeastern Cooperative Wildlife Disease Study: Athens, GA.
- Doster, G., ed. 2006. Raccoon Parvovirus. SCWDS Briefs. 22(1):6. Southeastern Cooperative Wildlife Disease Study: Athens, GA.
- Dubey, J. P., and C. Greene. 2006. Enteric coccidiosis. Pp. 775-779 in *Infectious Diseases of the Dog and Cat* (C. Greene, ed.). Third edition. Elsevier Inc: St. Louis, MO.
- Gaskell, R., and S. Dawson. 2005. Other feline viral diseases. Pp. 669-670 in *Textbook of Veterinary Internal Medicine* (S. J. Ettinger, ed.). Sixth edition. Elsevier Inc: St. Louis, MO.
- Greene, C., and D. Addie. 2006. Feline parvovirus infections. Pp. 78-88 in *Infectious Diseases of the Dog and Cat* (C. Greene, ed.). Third edition. Elsevier Inc: St. Louis, MO.
- Ketz-Riley, C. 2003. Salmonellosis and Shigellosis. Pp. 686-689 in *Zoo and Wild Animal Medicine* (M. Fowler, ed.). Fifth edition. Elsevier Inc: St. Louis, MO.
- Martin, H. D., and N. S. Zeidner. 1992. Concomitant cryptosporidia, coronavirus, and parvovirus infection in a raccoon (*Procyon lotor*). *Journal of Wildlife Disease*. 28(1):113-115.
- Raymond, J. 1997. Common infectious disease of raccoons. *ADDL Newsletter*. Animal Disease and Diagnostic Laboratory, Purdue University: West Lafayette, IN.
- Shenoy, K. 2007. Vaccinating young raccoons. *The Wildlife Rehabilitator*. 7(2):5. National Wildlife Rehabilitators Association: St. Cloud, MN.

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Baylisascaris procyonis: An Emerging Helminthic ZoonosisFrank Sorvillo,^{1*} Lawrence R. Ash,² O.G.W. Berlin,^{1†} JoAnne Yatabe,¹
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1. See letter "Thermal Death Point of Baylisascaris procyonis Eggs" in volume 13 on page 172.

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Abstract

Baylisascaris procyonis, a roundworm infection of raccoons, is emerging as an important helminthic zoonosis, principally affecting young children. Raccoons have increasingly become peridomestic animals living in close proximity to human residences. When *B. procyonis* eggs are ingested by a host other than a raccoon, migration of larvae through tissue, termed larval migrans, ensues. This larval infection can invade the brain and eye, causing severe disease and death. The prevalence of *B. procyonis* infection in raccoons is often high, and infected animals can shed enormous numbers of eggs in their feces. These eggs can survive in the environment for extended periods of time, and the infectious dose of *B. procyonis* is relatively low. Therefore, the risk for human exposure and infection may be greater than is currently recognized.

Key words: *Baylisascaris procyonis*, larva migrans, epidemiology.

Baylisascaris procyonis, a ubiquitous roundworm infection of raccoons (*Procyon lotor*), is increasingly being recognized as a cause of severe human disease (1,2). *B. procyonis* has a widespread geographic distribution, with infection rates as high as 70% in adult raccoons and exceeding 90% in juvenile raccoons (3). As with other ascarids, eggs are excreted in feces and must develop externally, typically in soil, to become infectious. When raccoons ingest infective eggs, larvae will hatch, enter the wall of the small intestine, and subsequently develop to adult worms in the small bowel. However, ingestion of eggs by other host animals, especially rodents and other small mammals, results in extraintestinal migration of larvae (4); an estimated 5%-7% of larvae invade the brain (5). The migration of helminth larvae through tissue in suboptimal hosts is termed larva migrans and may affect the viscera (visceral larva migrans [VLM]), the eye (ocular larva migrans [OLM]), or the nervous system (neural larva migrans [NLM]) (6). Raccoons may also become infected when they eat larvae that have become encapsulated in the tissues of rodents and other animals (3).

More than 90 species of wild and domesticated animals have been identified as infected with *B. procyonis* larvae (3). Outbreaks of fatal central nervous system disease caused by *B. procyonis* have occurred on farms and in zoos and research animal colonies and have affected commercial chickens, bobwhite quail, guinea pigs, commercial pheasants, and domestic rabbits (7-11). Natural infections have also been recognized in dogs, rodents, porcupines, chinchillas, prairie dogs, primates, woodchucks, emus, foxes, and weasels (12-16). Experimental infection of a variety of nonhuman primates has also been reported (17).

Human Infection

B. procyonis infection of humans typically results in fatal disease or severe sequelae (1,2,18-24; pers. comm. W. Murray). Clinical manifestations include eosinophilic encephalitis, ocular disease, and eosinophilic cardiac pseudotumor. Elevated peripheral cerebrospinal fluid eosinophilia can be detected in cases of meningoencephalitis. Eleven recognized human cases, four of them fatal, have been reported (Table). The first human case was reported in 1984 in a 10-month-old infant with fatal eosinophilic meningoencephalitis (78). At autopsy, numerous granulomas containing larvae of *B. procyonis* were observed in several organs and tissues (19). The brain was the most heavily affected, with granulomas concentrated in the periventricular white matter, around the dentate nuclei, and along the cerebral and cerebellar cortices. Numerous granulomas and larvae were also found in the mesentery and cardiac tissue. The infant's family lived in a rural, wooded area of Pennsylvania, and raccoons were nesting in unused chimneys at the time infection was acquired.

Case	Age	Sex	Location	Outcome
1	10 months	Male	Pennsylvania	Fatal
2	10 months	Male	Pennsylvania	Fatal
3	10 months	Male	Pennsylvania	Fatal
4	10 months	Male	Pennsylvania	Fatal
5	10 months	Male	Pennsylvania	Fatal
6	10 months	Male	Pennsylvania	Fatal
7	10 months	Male	Pennsylvania	Fatal
8	10 months	Male	Pennsylvania	Fatal
9	10 months	Male	Pennsylvania	Fatal
10	10 months	Male	Pennsylvania	Fatal
11	10 months	Male	Pennsylvania	Fatal

Table
Reported human cases of larval *Baylisascaris procyonis* infection

Four additional cases of eosinophilic encephalitis with similar pathologic characteristics have been documented. Magnetic resonance images from a human case of *Baylisascaris* encephalitis are shown in Figure 1. In patients who have survived central nervous system (CNS) invasion, severe neurologic sequelae have resulted. In a fatal case, an eosinophilic cardiac pseudotumor, affecting principally the left ventricle, was observed at autopsy; no larvae or granulomas were found in any other tissue examined.



Figure 1
Biopsy-proven *Baylisascaris procyonis* encephalitis in a 10-month-old boy. Axial T2-weighted magnetic resonance images obtained 12 days after symptom onset show abnormal high signal throughout most of the central white matter (arrows) compared with the (more...)

No effective therapy exists for the visceral form of *B. procyonis* larval infection. In an experimental model, mice treated with albendazole and diethylcarbamazine within 10 days after infection were protected from CNS disease (25); however, several anthelmintic agents have been used to treat human cases without success. Laser photocoagulation has been successful in treating ocular infection

(26).

Because the disease is transmitted by the fecal-oral route, human cases of *B. procyonis* infection typically occur in younger age groups, mainly infants, who often engage in oral exploration of their environment and are therefore more likely to be exposed to *B. procyonis* eggs. Raccoon activity near the patient's residence is often described. All but one of the reported patients to date have been male; however, there is no reason to believe that females are less susceptible to infection.

Diagnosis and Underrecognition of Infection

Diagnosis of *B. procyonis* infection is typically done through morphologic identification of larvae in tissue sections (27). However, accurate diagnosis requires experience in recognizing larval morphologic characteristics and differentiating among a number of possible larval nematode agents, including *Toxocara canis*, *T. cati*, *Ascaris lumbricoides*, and species of *Gnathostoma*, *Angiostrongylus*, and *Ancylostoma*, as well as larval cestode infections such as cysticercosis and echinococcosis (6,27). Characteristic features of *B. procyonis* larvae in tissue include its relatively large size (60 μ) and prominent single lateral alae (27) (Figure 2). While serologic testing has been performed in some cases as supportive diagnostic evidence, no commercial serologic test is currently available (28,29). However, a presumptive diagnosis can be made on the basis of clinical (meningoencephalitis, diffuse unilateral subacute neuroretinitis [DUSN], pseudotumor), epidemiologic (raccoon exposure), radiologic (white matter disease), and laboratory results (blood and CNS eosinophilia).



Figure 2

Cross-section of *Baylisascaris procyonis* larva in tissue section of brain, demonstrating characteristic diagnostic features including prominent lateral alae and excretory columns.

Human baylisascariasis is probably underrecognized, and the full spectrum of clinical illness is unclear. The agent is unknown to most clinicians and typically is not considered in a differential diagnosis. In addition, confirming the diagnosis requires an effective biopsy specimen that must contain an adequate cross section of a larva. Since small numbers of larvae can cause severe disease and larvae occur sporadically in tissue, a biopsy may frequently fail to include larvae; such a specimen will result in a negative finding. Moreover, larval morphologic characteristics may not be recognized or may be misidentified. The accurate diagnosis of parasites in tissues can be difficult even for trained microscopists, and mistaken identification, particularly of helminth larvae, is not uncommon (27). Finally, no commercial serologic test exists for the diagnosis of *B. procyonis* infection, and the sensitivity, specificity, and predictive value of available serologic tests are unknown. Evidence for underrecognition of larval *B. procyonis* infection can be found in several reported cases of DUSN caused by larvae compatible with *B. procyonis* and a case of eosinophilic meningoencephalitis reported in an infant in 1975 (26,30,31).

Infection Potential and Human Risk

Although relatively few human cases of baylisascariasis have been reported, several factors suggest that the likelihood of exposure and infection may be greater than is currently recognized. Raccoons have a widespread geographic distribution, and infection with *B. procyonis* is common in raccoon populations, with typically high prevalence rates observed. An infected raccoon can harbor numerous adult worms and may excrete large numbers of eggs. A single adult female worm may produce an estimated 115,000 to 877,000 eggs per day, and an infected raccoon can shed as many as 45,000,000 eggs daily (31,32). In light of the relatively low infectious dose of *B. procyonis* (estimated to be <5,000 eggs) and the viability of the eggs in the environment for months to years, the infection potential is not insubstantial. Raccoons have increasingly become peridomestic animals living in close proximity to human residences and are among the fastest growing wildlife populations nationwide. These animals benefit from feeding on abundant pet food left accessible, either accidentally or intentionally, and their populations can thrive under such conditions. In one suburban area near the residence of a recent patient in northern California, the raccoon population was measured at 30 animals per quarter acre. Areas frequented by raccoons and used for defecation were found in close proximity to human dwellings, and *B. procyonis* eggs are routinely recovered from these areas (7). Children, particularly toddlers, may be at particular risk of exposure.

Although baylisascariasis may indeed be underdiagnosed, asymptomatic human infection may be the typical response, and the limited number of cases reported may indicate that an unrecognized immune defect is necessary for severe infection to occur. The prevalence of asymptomatic infection in human populations has yet to be determined.

A Possible Agent of Bioterrorism

In an era of increasing concern about bioterrorism (33), certain characteristics of *B. procyonis* make it a feasible bioterrorist agent. The organism is ubiquitous in raccoon populations and therefore easy to acquire. Enormous numbers of eggs can be readily obtained, and these eggs can survive in an infectious form for prolonged periods of time. As with other ascariids, the eggs can remain viable in a dilute (0.5%-2%) formalin solution for an indefinite period of time, and animal studies suggest that *B. procyonis* has a relatively small infectious dose. Moreover, the organism causes a severe, frequently fatal infection in humans, and no effective therapy or vaccine exists. Introduction of sufficient quantities of *B. procyonis* eggs into a water system or selected food products could potentially result in outbreaks of the infection. A similar agent, *Ascaris suum*, a roundworm of pigs, was used to intentionally infect four university students who required hospitalization after eating a meal that had been deliberately contaminated with a massive dose of eggs (34). Contamination of community water sources would be difficult since the eggs of *B. procyonis* are relatively large (80 µm long by 65 µm wide) and would be readily removed by standard filtration methods or the flocculation and sedimentation techniques used by municipal water systems in the United States. However, posttreatment contamination or targeting of smaller systems could be possible.

Conclusion

Baylisascariasis is an emerging helminthic zoonosis with the potential for severe infection that may be a more important public health problem than is currently recognized. Educating the medical community is of paramount importance in helping to define the extent of infection. Physicians should consider *B. procyonis* infection in the differential diagnosis of patients with eosinophilic meningoencephalitis, DUSN, and eosinophilic pseudotumor. While infants and children have a higher probability of infection, all age groups are at risk. The public should be made aware of the potential risks of exposure to raccoons and raccoon feces. Raccoons should be discouraged as pets or should be routinely evaluated for *B. procyonis* infection and treated. However, screening and treatment may not be sufficient to prevent exposure, since the likelihood of reinfection is high. The public should be discouraged from feeding raccoons and should ensure that possible food sources (such as pet food, water, and garbage) are protected from raccoon access. Further study of the impact of larval *B. procyonis* infection on human health is warranted. Development of a standardized serologic test for *B. procyonis* would allow epidemiologic studies of its prevalence and incidence and help determine factors associated with infection. A sensitive and specific test would also provide a noninvasive method of diagnosis. Finally, a better understanding of the pathogenesis of *B. procyonis* infection and efforts to develop effective treatment approaches are warranted.

Acknowledgment

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Biography

- Dr. Sorvillo is Associate Professor, Department of Epidemiology, UCLA School of Public Health. His research interests include the epidemiology and control of infectious diseases, particularly parasitic agents.

Footnotes

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References

1. Park SY, Glaser C, Murray WJ, Kazacos KR, Rowley HA, Fredrick DR, et al. Raccoon roundworm (*Baylisascaris procyonis*) encephalitis: case report and field investigation. *Pediatrics* 2000;106:E55 [doi:10.1542/peds.106.4.e55. [PubMed]]
2. Rowley HA, Uhl RM, Kazacos KR, Sakanari J, Wheaton WW, Barckovich AJ, et al. Radiologic-pathologic findings in raccoon roundworm (*Baylisascaris procyonis*) encephalitis. *AJNR Am J Neuroradiol* 2000;21:415-20 [PubMed]
3. Kazacos KR, Boyce WM. *Baylisascaris larva migrans*. *J Am Vet Med Assoc* 1989;195:894-903 [PubMed]
4. Hamann KJ, Kephart GM, Kazacos KR, Gleich GJ. Immunofluorescent localization of eosinophil granule major basic protein in fatal human cases of *Baylisascaris procyonis* infection. *Am J Trop Med Hyg* 1989;40:291-7 [PubMed]
5. Kazacos KR. Raccoon ascarids as a cause of larva migrans. *Parasitol Today* 1986;2:253-5 doi:

SURVIVAL AND MOVEMENTS OF TRANSLOCATED RACCOONS IN NORTHCENTRAL ILLINOIS

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Abstract: Translocation of nuisance raccoons (*Procyon lotor*) is a common practice, but the fates of translocated animals after release are not known. We monitored postrelease survival rates and dispersal of radio-collared raccoons that were trapped as nuisance wildlife in suburban Chicago and translocated to a rural forest preserve (translocated urban), trapped in another wooded area and translocated to the forest preserve (translocated rural), and trapped and released in the forest preserve that served as the release site for the translocations (resident). Thirty-one raccoons were radiotracked in autumn 1993, and 45 were radiotracked in autumn 1994. We detected no differences in survival rates among the 3 treatment groups ($P > 0.05$). Resident raccoons tended to remain in the vicinity of the release site, whereas translocated raccoons left the release site within hours to days and dispersed into the surrounding area. Dispersing raccoons had high daily movement rates for the first 2 weeks postrelease but then seemed to establish new home ranges. Translocated raccoons frequently denned near human residences and in agricultural fields, whereas resident raccoons denned primarily in the forest preserve. Because translocated raccoons survived well, translocation could be an effective way to supplement depleted or reestablish extirpated populations of this species. However, translocating large numbers of raccoons for animal damage control could cause problems for other wildlife and human residents near release sites, and translocated animals could serve as vectors for wildlife diseases during zoonotic outbreaks.

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Key words: animal damage control, Illinois, nuisance wildlife, *Procyon lotor*, raccoon, survival rates, translocation.

Many species of wildlife are thriving in human-dominated landscapes. In the midwestern United States, for example, some species of game and furbearing mammals such as white-tailed deer (*Odocoileus virginianus*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), and opossums (*Didelphis virginiana*) are probably near historical record high numbers (Hoffmeister 1989). As populations of humans also continue to increase, conflicts between humans and wildlife are inevitable. In 1994, for example, 45,331 mammals were handled by nuisance wildlife control permittees in Illinois (Bluett 1995). Raccoons accounted for 13,193 (29%) of these mammals, and were by far the most common pest species. Illinois law allows for nuisance raccoons to be euthanized, but many are relocated to woodlots or forest preserves in rural areas. A total of 18,879 mammals was reported as translocated and released in Illinois in 1994, including 5,832 raccoons (Bluett 1995). These numbers are typical of recent years, but they probably underestimate the true numbers of translocated animals because many residents

of rural areas handle nuisance wildlife problems without reporting them to state agencies.

Translocating nuisance wildlife to rural habitats might seem a humane way to handle problem animals. However, survival rates of translocated animals after release are not known. Translocated deer, for example, generally have high mortality rates (O'Bryan and McCullough 1985, Jones and Witham 1990, Bryant and Ishmael 1991). Radiotelemetry studies of translocated raccoons have yielded mixed results. Frampton and Webb (1973) and Taylor and Pelton (1979) reported high survival rates among translocated raccoons, but Wright (1977) and Rosatte and MacInnes (1989) found more than half of the raccoons translocated in their studies died within a few months of release. Few studies have monitored the fates of raccoons translocated from urban to rural environments (Rosatte and MacInnes 1989), and no published studies have simultaneously monitored survival rates of resident raccoons at the release site.

Translocating wildlife could facilitate the spread of zoonotic diseases (Davidson and Nettles 1992). For example, the rapid spread of rabies in raccoons in the eastern United States

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has been linked to translocation of disease-carrying animals (Nettles et al. 1979, Smith et al. 1984, Jenkins and Winkler 1987). If translocated raccoons settle near human residences, they could add to nuisance wildlife problems in rural areas. Finally, translocated raccoons could compete with resident populations for food or other resources, disrupt existing social structure of resident populations, or increase rates of predation on songbird and waterfowl nests or other threatened wildlife.

In this study, we compared survival rates, dispersal from the release area, and causes of mortality among raccoons translocated from an urban to a rural area, translocated from a rural to a rural area, and, as a control, residents captured at the rural release site. We recorded habitats used as daily den sites by translocated and resident raccoons as an indicator of whether translocated raccoons were likely to add to wildlife nuisance problems for human residents of rural areas.

STUDY AREA

The study was conducted in southern Kane County and northern Kendall County, Illinois. The release site was the Lone Grove Forest Preserve (LGFP) in Kane County (80°33'45"E, 41°51'3"N). The 47.3-ha preserve included about 33.3 ha of mature upland forest in 2 blocks on either side of a paved road, 2 ha of old field undergoing succession, and 12 ha of open, mesic grassland bisected by a small creek.

The area surrounding LGFP was dominated by row-crop agriculture, primarily corn and soybeans. Agricultural fields were occasionally dissected by creeks or drainage ditches. A few isolated woodlots were scattered throughout the region. Most woodlots were small (<10 ha) and appeared as islands in the agricultural matrix. The only other trees in this landscape were associated with farmsteads, residential areas, and occasionally along creeks.

METHODS

We studied 3 treatment groups in each year: resident raccoons were live-trapped in LGFP, translocated rural raccoons were live-trapped in another wooded area (Max McGraw Wildlife Foundation, Dundee, Illinois, USA), and translocated urban raccoons were captured by licensed animal control agents in response to nuisance wildlife complaints (from Kane, DuPage,

and Cook counties, Illinois, USA). In 1993, we captured and radiocollared resident raccoons from 30 August to 1 October, translocated rural raccoons from 2 to 29 September, and translocated urban raccoons from 6 to 29 September. In 1994, we captured and radiocollared resident raccoons from 28 July to 1 August, translocated rural raccoons from 3 to 11 August, and translocated urban raccoons from 14 August to 23 September. We followed raccoon movements from 1 September to 15 November 1993, and 28 July to 12 November 1994. We conducted our study in the fall of each year because fall is when the greatest numbers of nuisance raccoon complaints occur.

We captured raccoons in box traps, sedated them with Telazol, then weighed, measured, and ear-tagged them for individual identification. We fitted approximately equal numbers of adult males and females in each treatment group with radiocollars (Advanced Telemetry Systems, Isanti, Minnesota, USA). Radiocollars were equipped with a mortality switch and weighed 120–126 g. We held animals in their traps until they recovered from the anaesthetic, and we then released them at LGFP. We released all translocated animals at a parking area on the north side of LGFP because this was the standard practice of many nuisance animal control agents. We released resident raccoons either at their capture site or at the parking area if the capture site was less than about 500 m away, and we released raccoons within 24 hr of capture. The Laboratory Animal Care Advisory Committee of the University of Illinois, Urbana-Champaign approved all procedures for capture and handling of raccoons.

After release, we attempted to locate radiocollared raccoons daily until mid-November. We did not delay data collection for an acclimation period because some responses of interest (e.g., dispersal from the release site) typically occurred in the first few days after release. Azimuths were recorded via a vehicle-mounted, single-peak yagi antenna system. We recorded 4 azimuths/raccoon for each daily location from a set of fixed points corresponding to landscape features easily identifiable on maps and aerial photographs. Because our study area was generally covered with a grid system of county roads at 1.6-km (1-mile) intervals, we were able to confirm the locations by driving around the area until we had identified the particular landscape feature where the animal had denned. We

then plotted daily locations of radiocollared raccoons on aerial photos. We determined linear distance from the release point, and we determined habitat classification for each location (woodlot, hedgerow, waterway, agricultural field, residential property). We used monthly checks from December through April in each year to monitor survival through the winter. Aerial searches (1 in 1993, 4 in 1994) were used to supplement ground searches.

We estimated survival functions via the Kaplan-Meier method (Kaplan and Meier 1958) for the period when daily locations were obtained for each treatment group. We estimated survival and its associated standard error with the Kaplan-Meier survivorship analysis program, Version 1.0 (Kulowiec 1988). We used log-rank tests (SPSS 1993) to compare differences among survival functions over time periods when we had complete data for all treatment groups (45 days in 1993, 50 days in 1994), but we present the survival functions for all data collected. We analyzed all data as days postrelease, because releases were staggered over 32 days in 1993 and 57 days in 1994. This staggering of release dates was because of the time required to capture equal numbers of adult male and female raccoons for each treatment group and waiting for suitable animals for the translocated urban sample to be captured in response to nuisance wildlife complaints. When the mortality switch was activated in a radiocollar, we located the dead raccoon (or the radiocollar if it had been removed) and attempted to determine the cause of mortality. We tested for differences in overwinter survival among treatment groups via chi-squared tests of independence.

To examine dispersal, we first compared the numbers of raccoons in each treatment group that remained near (<1 km from) the release site. The numbers in each treatment group still denning <1 km from the release site at 50 days postrelease were compared via chi-square tests of independence. Second, we compared mean linear distances from the release site for individuals that survived to the last 2 weeks of tracking in each treatment group in each year. Individuals that died or were lost before the last 2 weeks of tracking were not included in the statistical analysis. We used Kruskal-Wallis tests to examine differences among treatment groups because variances were not equal among groups. When mean linear distances differed (P

< 0.05) among treatment groups, we used Mann-Whitney U -tests (SPSS 1993) to conduct pairwise comparisons between groups.

We classified daily den locations as occurring in 1 of 5 general habitat types: wooded areas, hedgerows, creeks or ditches, crop fields, or residential areas (farmsteads and other human habitations). Habitat use at this scale was easily determined in the field when we recorded azimuths, given the open landscape and grid-like system of rural roads. Because only some individuals, particularly resident raccoons, were located consistently, we quantified habitat use as frequency distributions for comparative purposes. A frequency distribution of den sites in each habitat was first calculated for each individual. Frequencies in each habitat type were then summed over all individuals in each treatment group for each year, and overall frequency distributions were recalculated from these summed values. Thus, each individual contributed equally to the final frequency distribution for each treatment group in each year.

RESULTS

We radiocollared and tracked 76 raccoons: 31 (15 M, 16 F) in 1993 and 45 (23 M, 22 F) in 1994. Sample size in each treatment group was equal within each year, with the exception that we radiocollared 11 raccoons in the translocated rural group in 1993 (instead of 10). We monitored radiocollared animals for 45–77 days in 1993 and 50–107 days in 1994.

Survival functions did not differ between males and females in either year (1993: $\chi^2_1 = 0.75$, $P = 0.39$; 1994: $\chi^2_1 = 1.38$, $P = 0.24$); therefore, we pooled sexes for further analysis. We analyzed each year separately because we tracked raccoons for >1 month longer in 1994 than in 1993.

Survival functions did not differ among the 3 treatment groups (1993: $\chi^2_2 = 0.18$, $P = 0.91$; 1994: $\chi^2_2 = 0.66$, $P = 0.72$; Fig. 1). We also did not detect differences in survival estimates among treatment groups in either year (mean estimate at 45 days postrelease for 1993: resident = 0.70 [95% CI = 0.27], translocated rural = 0.79 [95% CI = 0.27], translocated urban = 0.78 [95% CI = 0.31]; mean estimate at 50 days postrelease for 1994: resident = 0.93 [95% CI = 0.12], translocated rural = 0.85 [95% CI = 0.20], translocated urban = 0.87 [95% CI = 0.18]). Fourteen known deaths occurred during the daily radiotracking periods in 1993 and

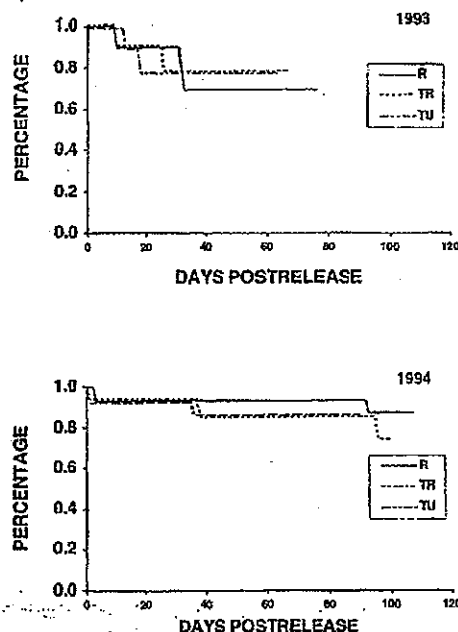


Fig. 1. Kaplan-Meier survival functions, estimated from days postrelease, for radiocollared raccoons trapped and released at the Lone Grove Forest Preserve, Kane County, Illinois (resident = R), trapped in another wooded area and translocated to the forest preserve (translocated rural = TR), and trapped as nuisance wildlife in suburban Chicago and translocated to the forest preserve (translocated urban = TU). Daily tracking was conducted from 30 August to 15 November in 1993 and from 28 July to 12 November in 1994. Curves are of different lengths because some groups were tracked for longer intervals than others.

1994: 5 raccoons were killed by vehicles, 4 were apparently killed by local homeowners (3 radiocollars were found discarded, 1 raccoon was found shot), 1 raccoon was trapped and killed

as nuisance wildlife on private property, and 4 died of unknown causes (death occurred in tree cavities or in ground burrows, hence carcasses were not recovered for necropsy). Mortalities were distributed similarly among all 3 treatment groups (Table 1). In addition, 10 radiocollared animals were lost during the daily tracking periods, and their fates were unknown.

Of 19 radiocollared raccoons known alive at the end of the tracking period in 1993, 14 survived the winter, 3 died between November and April, and 2 disappeared (fates unknown). Of 33 radiocollared raccoons known alive at the end of the tracking period in 1994, 23 survived the winter, 5 died between November and April, and 5 disappeared (Table 1). Pooling data from both years, the numbers of raccoons that survived the winter, died during the winter, or were lost during the winter were not different among treatment groups ($\chi^2_4 = 3.86$, $P = 0.43$). Excluding lost animals from the analysis did not affect the results ($\chi^2_2 = 2.17$, $P = 0.34$).

Resident raccoons denned in or near LGFP during the radiotracking periods in both years, with the exception of 1 male in 1993 and 1 female in 1994 (the latter wandered widely but returned periodically until killed on the road about 1 month postrelease). In contrast, almost all translocated raccoons dispersed from the release site (Fig. 2). In 1993, only 2 of 21 translocated raccoons were still denning <1 km from the release site at the end of the tracking period, and most had left LGFP within 1–2 days postrelease. In 1994, only 4 of 30 translocated raccoons were still denning <1 km from the release site at the end of the tracking period. Pooling data from both years and excluding an-

Table 1. Fates of radiocollared raccoons trapped and released at the Lone Grove Forest Preserve, Kane County, Illinois (resident), trapped in another wooded area and translocated to the forest preserve (translocated rural), and trapped as nuisance wildlife in suburban Chicago and translocated to the forest preserve (translocated urban), 1993–94.

Treatment group	1993			1994		
	Survived	Died	Disappeared ^a	Survived	Died	Disappeared
Daily tracking period^b						
Resident	7	3		13	2	
Translocated rural	7	2	2	8	3	4
Translocated urban	5	2	3	12	2	1
Overwinter^c						
Resident	5	1	1	11	2	
Translocated rural	5	1	1	4	2	2
Translocated urban	4	1		8	1	3

^a Individuals could no longer be located, no mortality signal detected.

^b 1993: 30 August to 15 November; 1994: 28 July to 12 November.

^c November to April.

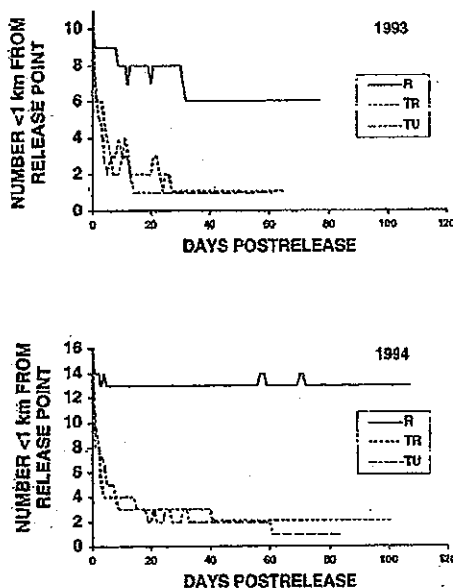


Fig. 2. Numbers of radiocollared raccoons trapped and released at the Lone Grove Forest Preserve, Kane County, Illinois (resident = R), trapped in another wooded area and translocated to the forest preserve (translocated rural = TR), and trapped as nuisance wildlife in suburban Chicago and translocated to the forest preserve (translocated urban = TU) that denned <1 km from the release site over time (days postrelease), 1993–94. Declines include losses due to both dispersal and mortality. Curves are of different lengths because some groups were tracked for longer intervals than others.

imals that died or were lost, 18 of 20 resident raccoons, 3 of 16 translocated rural raccoons, and 3 of 17 translocated urban raccoons were still denning <1 km from the release site at 50 days postrelease ($\chi^2_2 = 25.93$, $P < 0.001$). Differences in residency among the treatment groups were underestimated by this analysis because 4 of the raccoons in the resident sample that died before 50 days postrelease had consistently denned in the LGFP during the period they were monitored prior to their deaths.

Whereas most of the resident raccoons remained near the release site, many of the translocated rural and translocated urban raccoons dispersed considerable distances (Fig. 3). Three translocated raccoons were located 24, 25, and 60 km from the release site during aerial searches. The mean distance from the release site, excluding known mortalities, at the end of the period of daily tracking each year differed among treatment groups (1993: $\chi^2_2 = 7.78$, $P = 0.02$; 1994: $\chi^2_2 = 18.95$, $P < 0.001$). In both

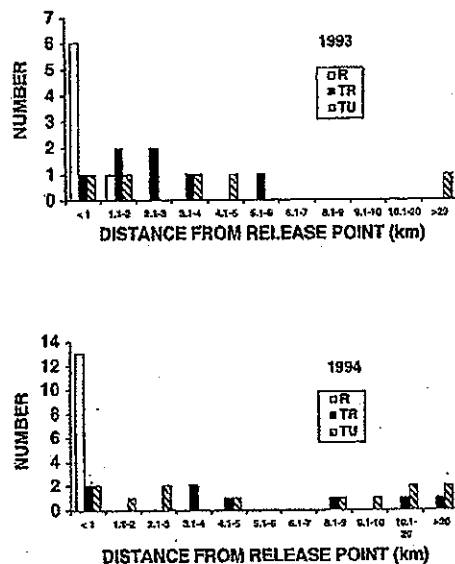


Fig. 3. Distances from the release site for radiocollared raccoons trapped and released at the Lone Grove Forest Preserve, Kane County, Illinois (resident = R), trapped in another wooded area and translocated to the forest preserve (translocated rural = TR), and trapped as nuisance wildlife in suburban Chicago and translocated to the forest preserve (translocated urban = TU) and known alive at the end of the period of daily radiotracking, 1993–94.

years, distances from the release site for resident raccoons (1993: 731 ± 424 m; 1994: 391 ± 125 m) were less than those for both translocated rural (1993: 3796 ± 2852 m; 1994: 9092 ± 8013 m) and translocated urban raccoons (1993: 7218 ± 8055 m; 1994: 7870 ± 6962 m; $P_s < 0.05$), whereas translocated groups did not differ in either year ($P_s > 0.05$).

Resident raccoons denned most frequently in wooded areas (i.e., LGFP; Fig. 4). Translocated raccoons frequently denned near human residences as well as in wooded areas, and they often denned in agricultural fields and along waterways.

DISCUSSION

In both years of our study, about 75–80% of the translocated raccoons survived until ≥ 2 months postrelease (Fig. 1), which did not differ from survival estimates for raccoons trapped at the release site. The survival of a translocated individual probably depends on a variety of factors including condition and health of the translocated animal, population density at the release site, area and quality of habitat at the release

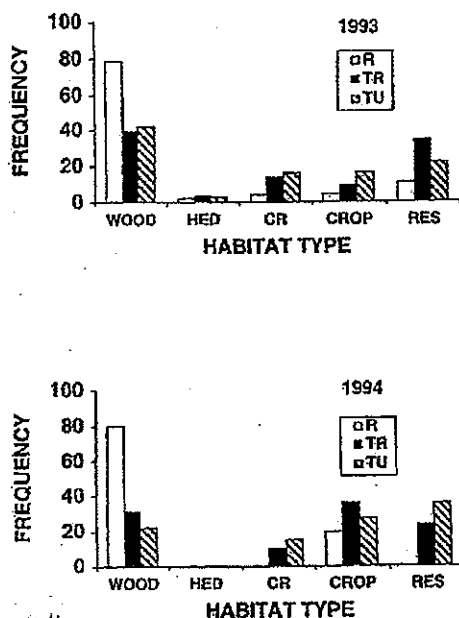


Fig. 4. Frequency distributions of habitats used for den sites during 1993-94 by radiocollared raccoons trapped and released at the Lone Grove Forest Preserve, Kane County, Illinois (resident = R), trapped in another wooded area and translocated to the forest preserve (translocated rural = TR), and trapped as nuisance wildlife in suburban Chicago and translocated to the forest preserve (translocated urban = TU), weighted so that each individual raccoon contributes equally. WOOD = woodlot or forest preserve; HED = hedgerow or treeline; CR = creek or drainage ditch; CROP = agricultural field; RES = farmstead, house, or other human construction.

site, and time of year. Frampton and Webb (1973) suggested translocations were most likely to succeed when population density at the release site was low. Raccoons were abundant in the area around LGFP; all 15 adult raccoons radiocollared in 1994 were captured in LGFP in only 5 nights (70 trapnights), and an attempt to identify resident raccoons in 1993 via a mark-recapture protocol resulted in 48 raccoons receiving ear tags in LGFP over a 45-day period in August-September. High survival rates of translocated raccoons in our study are probably attributable to benign weather conditions during autumn and abundant food and cover provided by agricultural crops.

The 10 "lost" raccoons in our study were treated as censored data in the calculation of survival function, and we assume they dispersed beyond the study area. Alternatively, their transmitters may have failed, but all 10 failures occurring in the translocated groups and none in

the resident group is improbable. Only 3 raccoons were never relocated following release; 7 of the 10 "lost" raccoons were located for periods of 17-62 days postrelease, and all had dispersed from LGFP and moved extensively in the surrounding area prior to their last being located. Lost raccoons might have been resting in places such as culverts or barns where their signals were blocked. Finally, some of the lost raccoons could have been poached or killed as nuisance wildlife and their radiocollars disabled or discarded in places where signals would not be detected.

Rosatte and MacInnes (1989) reported that about 50% of 24 radiocollared raccoons transported from urban Toronto, Ontario, Canada, to a rural release site in the autumn died within 3 months of translocation. Wright (1977) also reported >57% mortality within 74 days of translocation for 28 radiocollared raccoons transported from Florida to Kentucky in the spring. In contrast, Taylor and Pelton (1979) found that 64% of 14 radiocollared raccoons translocated from bottomland forest to an upland forest preserve in the spring in Tennessee survived and established new home ranges, and Frampton and Webb (1973) detected only 20% mortalities for 10 radiocollared raccoons translocated from Coastal Plain to Upper Piedmont habitat in the spring in South Carolina, although the latter study had many technical difficulties. Thus, our survival estimates were higher than those of most other studies, but differences among habitats and timing of releases make comparisons difficult. Furthermore, none of the previous studies compared survival of translocated raccoons to that of a resident, control group.

Because we did not recapture radiocollared raccoons, we did not know the physical condition of animals at the beginning of winter. Overwinter survival rates were similar, however, among the 3 treatment groups. Severe winter weather did not begin until about 3 months after translocations were conducted, and translocated raccoons still being monitored at the end of the autumn radiotracking period had typically established new home ranges and den sites by that time.

In contrast to survival rates, dispersal patterns differed considerably between resident and translocated raccoons. Most of the resident sample remained in the vicinity of LGFP; with few exceptions, the linear distance between successive den sites averaged <400 m. Both trans-

located rural and translocated urban raccoons typically dispersed from the release site within hours to a few days. Dispersal could be a consequence of competition for den sites or other resources with resident animals at the release site, or due to disorientation and attempted homing by the released animals. The probability that a translocated raccoon would remain at the release site and the total distance dispersed from the release site by the end of the tracking period did not differ between raccoons translocated from urban to rural or from rural to rural environments.

The 24 translocated urban raccoons tracked by Rosatte and MacInnes (1989) similarly dispersed from their rural release sites but generally settled within 10–20 km of the release site. Other studies have reported some long-range movements by translocated raccoons: Wright (1977) reported mean dispersal distances of 27.5 km for 28 radiocollared and 25.7 km for 13 recovered (of 1,750 ear-tagged) raccoons moved from Florida to Kentucky, and Tabatabai and Kennedy (1989) reported a mean dispersal distance of 32.4 km for 25 recovered (of 450 ear-tagged) raccoons moved from urban to rural areas in Tennessee. The latter 2 studies detected maximum dispersal distances of 107 km and 295 km, respectively, from release sites for recovered, ear-tagged animals.

Because most of the translocated raccoons did not stay at the release site and sometimes dispersed considerable distances, translocated animals could add to nuisance wildlife problems for rural human residents or increase the spread of disease during zoonotic outbreaks. Raccoons exhibit high incidences of exposure to various wildlife diseases (e.g., Krebs et al. 1995, Centers for Disease Control 1997), and the risk of translocating diseases or parasites along with nuisance animals is an important consideration (Cunningham 1996). Hence, because some translocated animals disperse for long distances after translocation, the rate of spread of zoonotic disease could be accelerated considerably. Indeed, many translocated raccoons denned near human residences or on residential property, including backyards, barns, houses, and even a gas station. At least 4 translocated raccoons were captured or killed by local human residents because of nuisance behavior (1 during the tracking period, 3 during the winter of 1994).

Further research on the effects of translocat-

ing raccoons is warranted because of the potential consequences for other wildlife species. Raccoons are important nest predators on songbirds (Whelan et al. 1994, Donovan et al. 1997), game birds (Miller and Leopold 1992), waterfowl (Urban 1970, Duebber and Kantrud 1974, Greenwood 1981, Jobin and Picman 1997), and other wildlife (e.g., turtles; Christens and Bider 1987, Congdon et al. 1987). Translocated raccoons also may compound the intense predation pressure already experienced by some wildlife in fragmented habitats. In some areas, existing management practices such as waterfowl management (Urban 1970, Fritzell 1978, Sargeant et al. 1993) near a release site could be jeopardized by an infusion of translocated raccoons. Finally, increased competition for food and den sites, or disruption of social organization, could negatively affect resident raccoons.

MANAGEMENT IMPLICATIONS

Our study shows that survival rates of translocated raccoons can be as high as those of resident animals. This finding supports the view of some that translocation is a humane method for handling nuisance wildlife problems (Diehl 1988). However, large numbers of raccoons translocated into an area could increase competition for resources with resident raccoons, predation pressure on other wildlife, and nuisance wildlife problems for human residents near release sites. Records from licensed animal controllers in Kane County show that ≥ 84 raccoons were released in LGFP in 1993 prior to our study, and 823 more were released at other sites within the county. Raccoons are abundant in most of the Midwest, and there are few, if any, places to release a translocated raccoon where there is not already a substantial population of other raccoons or people. Further, most nature preserves around urban or suburban areas are relatively small and are unlikely to accommodate the thousands of animals handled by animal control professionals each year. Even when a translocated raccoon survives, however, our study indicates it rarely stays at the release site. When the risk of facilitating the spread of disease during zoonotic outbreaks also is considered, translocation of nuisance wildlife becomes a less attractive option.

Alternatives to translocation for solving nuisance wildlife problems also have drawbacks. The simplest alternative is euthanasia, but it is the most controversial. The use of reproductive

inhibitors (Howard 1967) or surgical sterilization (Bojrab et al. 1983) is costly and labor intensive. Physically excluding nuisance wildlife from private property would be the most humane solution but may be difficult and ineffective. Thus, the negative effects of translocating large numbers of animals on wildlife and human residents of rural areas near release sites must be weighed against the negative public opinion and ethical considerations concerning euthanasia or sterilization when determining policy for the disposition of nuisance wildlife.

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LITERATURE CITED

- BLUETT, B. 1995. Nuisance wildlife control in Illinois—1994 summary. Illinois Department of Conservation, Furbearer Program Management Note 95-1.1-4.
- BOJRAB, M. J., S. W. CRANE, AND S. P. ARNOCKY, editors. 1983. Current techniques in small animal surgery. Lea and Febiger, Philadelphia, Pennsylvania, USA.
- BRYANT, B. K., AND W. ISHMAEL. 1991. Movement and mortality patterns of resident and translocated suburban white-tailed deer. Pages 53–58 in L. W. Adams and D. L. Leedy, editors. Wildlife conservation in metropolitan environments. National Institute for Urban Wildlife, Columbia, Maryland, USA.
- CENTERS FOR DISEASE CONTROL. 1997. Update: raccoon rabies epizootic—United States. Morbidity and Mortality Weekly Report 45:232–234.
- CHRISTENS, E., AND J. R. BIDER. 1987. Nesting activity and hatching success of the painted turtle (*Chrysemys picta marginata*) in southwestern Quebec. *Herpetologica* 43:55–65.
- CONGDON, J. D., G. L. BREITENBACH, R. C. VAN LOBEN SELS, AND D. W. TINKLE. 1987. Reproduction and nesting ecology of snapping turtles (*Chelydra serpentina*) in southeastern Michigan. *Herpetologica* 43:39–54.
- CUNNINGHAM, A. A. 1996. Disease risks of wildlife translocations. *Conservation Biology* 10:349–353.
- DAVIDSON, W. R., AND V. F. NETTLES. 1992. Relocation of wildlife: identifying and evaluating disease risks. Transactions of the North American Wildlife and Natural Resources Conference 57: 466–473.
- DIEHL, S. R. 1988. Selective removal as an alternative in deer management. Pages 1–10 in L. Nielson and R. D. Brown, editors. Translocation of wild animals. Wisconsin Humane Society, Milwaukee, Wisconsin, USA.
- DONOVAN, T. M., P. W. JONES, E. M. ANNAND, AND F. R. THOMPSON, III. 1997. Variation in local-scale edge effects: mechanisms and landscape context. *Ecology* 78:2064–2075.
- DUEBBERT, H. F., AND H. A. KANTRUD. 1974. Upland duck nesting related to land use and predator reduction. *Journal of Wildlife Management* 28:257–265.
- FRAMPTON, J. E., AND L. C. WEBB. 1973. Preliminary report on the movement and fate of raccoons released in unfamiliar territory. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 27:170–183.
- FRITZELL, E. K. 1978. Habitat use by prairie raccoons during the waterfowl breeding season. *Journal of Wildlife Management* 42:118–127.
- GREENWOOD, R. J. 1981. Foods of prairie raccoons during the waterfowl nesting season. *Journal of Wildlife Management* 45:754–760.
- HOFFMEISTER, D. F. 1989. Mammals of Illinois. University of Illinois Press, Urbana, Illinois, USA.
- HOWARD, W. E. 1967. Biocontrol and chemosterilants. Pages 343–386 in W. W. Kilgore and L. Douth, Jr., editors. Pest control. Academic Press, New York, New York, USA.
- JENKINS, S. R., AND W. C. WINKLER. 1987. Descriptive epidemiology from an epizootic of raccoon rabies in the middle Atlantic states, 1982–1983. *American Journal of Epidemiology* 126:429–437.
- JOBIN, B., AND J. PICMAN. 1997. Factors affecting predation on artificial nests in marshes. *Journal of Wildlife Management* 61:792–800.
- JONES, J. M., AND J. H. WITHAM. 1990. Post-translocation survival and movements of metropolitan white-tailed deer. *Wildlife Society Bulletin* 18: 434–441.
- KAPLAN, E. L., AND P. MEIER. 1958. Nonparametric estimation from incomplete observations. *Journal of the American Statistical Association* 53:457–481.
- KREBS, J. W., M. L. WILSON, AND J. E. CHILDS. 1995. Rabies—epidemiology, prevention, and future research. *Journal of Mammalogy* 76:681–694.
- KULOWIEC, T. G. 1988. Kaplan-Meier survivorship analysis program. Version 1.0. Missouri Department of Conservation, Wildlife Research Section, Columbia, Missouri, USA.
- MILLER, J. E., AND E. B. LEOPOLD. 1992. Population influences: predators. Pages 119–128 in J. G. Dickson, editor. The wild turkey: biology and management. Stackpole Books, Harrisburg, Pennsylvania, USA.

